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NEWSLETTER

JANUARY 1984



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FIRE BLIGHT

FEUERBRAND

BACTERIEVUUR

FEU BACTERIEN

INTERNATIONAL WORKING GROUP

ON FIRE BLIGHT RESEARCH

I N T E R N A T I O N A L W O R K I N G G R O U P
O N
F I R E B L I G H T R E S E A R C H

NEWSLETTER

from the
Plant Protection Commission
International Society for Horticultural Science
in cooperation with
U.S. Deciduous Tree Fruit Disease Workers
and
European & Mediterranean Plant Protection Organization

J A N U A R Y 1 9 8 4

United States Department of Agriculture
Agricultural Research Service

Appalachian Fruit Research Station
Kearneysville, West Virginia, USA

Letter from the Editor

The third international workshop was a great success and all the persons involved with its organization should be duely congratulated. During the workshop, several persons asked to be added to the membership list of the working group. So, during 1983, the membership thus increased by 32 to a total of 275. Every year, however, it is becoming increasingly more laborious to assemble, prepare, and mail our newsletter. Therefore, starting next year (1985), we need to reduce our mailing list considerably and I hereby urge everyone to read the following notice about our newsletter:

NOTICE

Working Group Membership Survey

This is your final copy of the fire blight newsletter unless the last page in this 1984 issue is completed in full and returned to me by September 1.

By the end of 1983, following 17 years after its initial occurrence in the Netherlands (1966), fire blight has conquered a considerable portion of the European Continent. For all practical purposes the disease is present west of a straight line from Toulouse, France in the south, via Strassburg and Berlin to Gdansk, Poland in the north, with a small forward bulge of about 200 km in the center, from Strassburg facing eastward.

Even though the disease was reported from Egypt in 1964, the severe outbreak in 1983 raised considerable alarm in the limited pear industry in that country. Surrounded by desserts and the Mediterranean Sea, fire blight in northern Egypt should not pose a further threat to other pome fruit producing countries.

Finally, I am delighted to announce that on October 5, 1983, the first intercontinental connection was established from Wageningen (Netherlands) to Kearneysville (USA) in regard to searching the USDA fire blight literature collection through the telephone and computer net works. Anyone who wishes to retrieve titles from this literature collection should first get in contact with Mr. Gary Lightner (304-725-3451, ext. 36) who in turn will supply you with the necessary information to make the connection.



TOM VAN DER ZWET, Secretary
North American Section
International Working Group
on Fire Blight Research

INTERNATIONAL WORKSHOP ON FIRE BLIGHT

HELD IN BORDEAUX, FRANCE

(SEPTEMBER 12-16, 1983)

The third International Workshop on Fire Blight was held at INRA, Pont-de-la-Maye near Bordeaux, France. Following the first two meetings in 1977 (Neth.) and 1980 (W. Germ.), this workshop was attended by 75 scientists representing 20 countries. Fifty papers or posters were presented into 6 sections dealing with different aspects of the disease: Epidemiology (2 sessions), Control, Physiology and Genetics, Breeding, Survey and action programs. Even though only 10 countries (8 in Europe) actually have fire blight, emphasis was placed on how to prevent the disease from entering into Spain, Switzerland and Italy.

Following 2 days of paper poster presentations, one day was spent making a bus trip to the area of Dax (160 km south of Bordeaux) to visit and inspect the experimental field plots partly subsidized by the AGRIMED Programme Committee (Group on Fire Blight in Pears, Apples and Related Species) of the Commission of the European Communities. Presently, this is the largest experimental plot in the warmest part of Europe where fire blight is endemic, providing suitable conditions to test pears, apples and rosaceous ornamentals for resistance to the disease, and allowing climatic and epidemiological studies in a new type of climate.

EXPERIMENTAL ORCHARD

DAX

The establishment of experimental plots in a climatic zone very different from that in northern Europe gives many opportunities for fire blight research. It offers northern European research workers the opportunity to test their selections while at the same time Mediterranean workers can test the susceptibility of their cultivars and new hybrids. It also offers researchers the opportunity to study the epidemiology and ecology of the organism under different conditions found at home. However, one of the primary objectives of this project is to determine the susceptibility of the principal fruit cultivars and ornamentals of Pomoideae in Europe.

A. HISTORY

The extension of fire blight into Europe and notably into the Aquitaine fruit-growing area in 1977-78 initiated the development of a research program for this disease. Three principal reasons justified this development : first, a total absence of data on the susceptibility of European cultivars; second, a difficulty in transposing epidemiological data developed under other conditions (agronomic, climatic); and third, an inability to adapt hybrids selected for resistance in U.S.A. to the economic and cultural conditions of Europe.

As soon as fire blight was found in the Dax area (1978), I.N.R.A. and Plant Protection Service considered the possibility of developing and maintaining experimental plots and a laboratory in that area, where two essential conditions are met : a contaminated area within a small fruit growing area and a favorable climate for the disease.

This project was initiated in 1979 with the first plantings in the experimental orchard. With the financial support of EEC it is possible to provide a service to all its members.

B. PROGRAM

1. To determine the susceptibility of cultivars in the collection.
2. To study the epidemiology of fire blight
 - evaluation of climatic risks (Billing system)
 - overwintering and dissemination of the pathogen
 - survival of bacteria on host surfaces.
3. To evaluate classic chemical products and new formulations.
To study the efficacy and phytotoxicity (coppers) of chemicals on homogenous and susceptible hosts (Golden Delicious, Cotoneaster, Salicifolius...)
4. To intensify the cultivar selection process to obtain a fire blight resistant pear.

C. FINANCING

Financing is required for the rental of land and for services such as labor and materials. It is shared between the "Ministere de l'Agriculture of France (managed by Plant Protection service and the E.E.C. (managed by I.N.R.A.

D. MANAGEMENT

The planting and maintenance are done by the grower (M. DUSSARAT), using the normal farm equipment. P. LECOMTE is the experienced technician in charge of the experimental fields.

E. ENVIRONMENT

The climate is one of the hottest and wettest in France with an annual rainfall near 1 200 mm. The conditions are favorable not only for tree fruit culture but also for diseases (scab, fire blight) and weeds.

Spring is often a time of alternating wet and dry periods which make the first two years of a planting very difficult. Good water retention by the soil, however, permits tree growth to recoup any losses caused by spring drought and often assures excellent growth.

To better understand the climate of this region, it is necessary to observe the wide variety of plant species, including numerous tropical plants which prosper here.

F. ORCHARD EXPANSION

Year	1979	1980	1981	1982	1983
Ha	2,6	3,5	5,5	8,3	8,5

The experimental plots are located in a 30 hectare commercial farm containing apples, pears, black currents, corn, etc...

G. EXPERIMENTAL PLAN

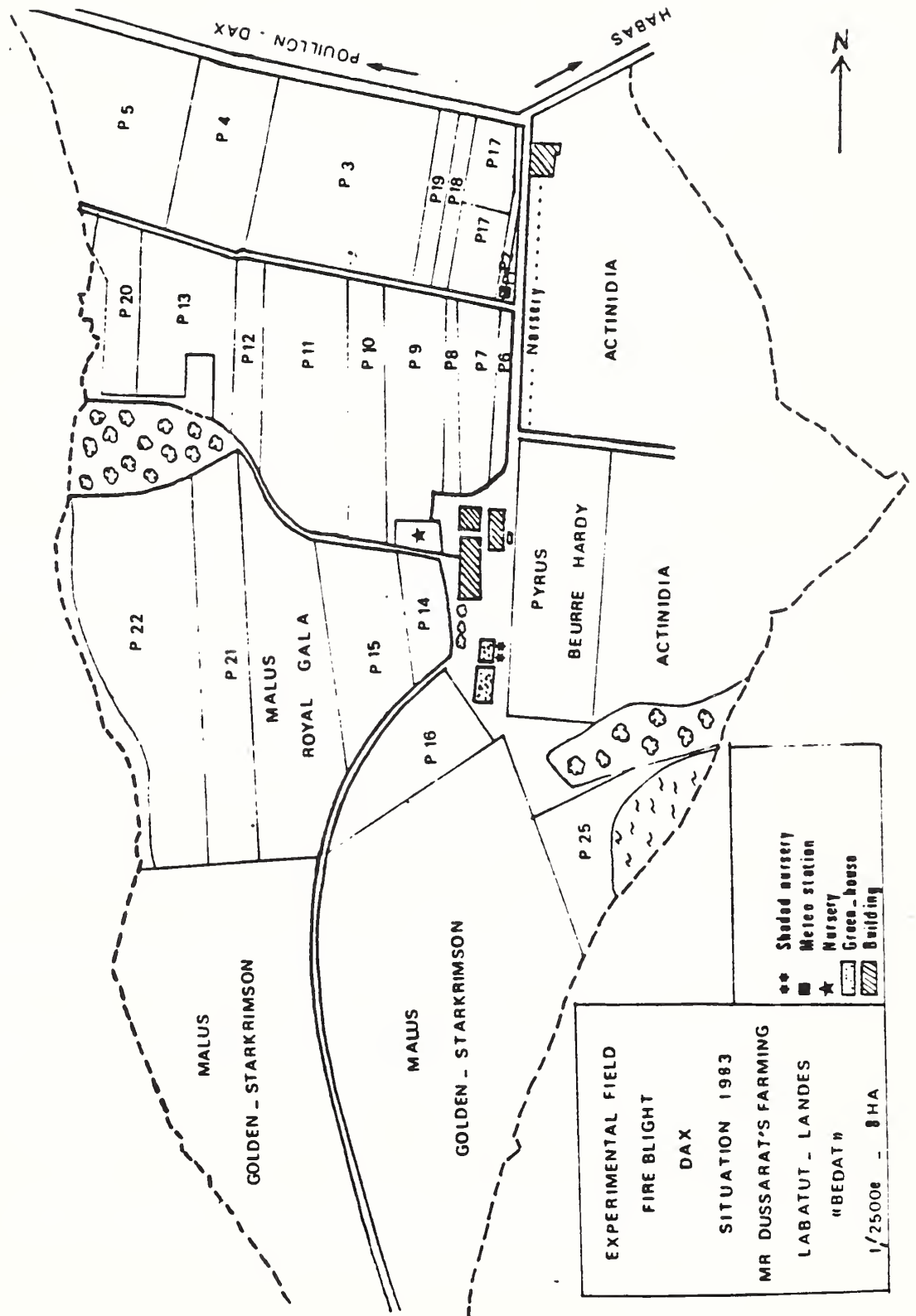
Today 25 experimental plots compose the plan (see accompanying plan with detail of the plots).

VERGER EXPERIMENTAL DAX 1983

Détail des plantations.

. P1	ORNEMENT : Pyracantha, Cotoneaster, Sorbus : 1979.	900 m2
. P2	POIRIER : Comice, Morettini, Epine du Mas (+ 20 ans)	500 m2
. P3	POIRIER : Passe-crassane : 1979-1980	9 000 m2
. P4	POIRIER : Essai variétal x Pathologie : 1981	4 600 m2
. P5	POIRIER : Collection variétale 82 variétés : 1981	} 5 250 m2
. P5 PG	PORTE-GREFFE : Collection variétale : Malus, Cydonia, Pyrus : 1983	
. P6	ORNEMENT : Pyracantha, Cotoneaster : 1979-1980	655 m2
. P7	POIRIER : Hybrides : 1983	1 800 m2
. P8	POIRIER : Hybrides : 1980	800 m2
. P9	POIRIER : Hybrides : 1981	} 7 200 m2
. P10	POIRIER : Hybrides W1 Retour Wageningen 1980 Marcottière PG 1981 + hybrides poiriers 1983	
. P11	POMMIER : Collection de 67 variétés 1980-1981	6 700 m2
. P12	POMMIER : Hybrides : 1982	1 600 m2
. P13	POIRIER : Hybrides : 1982	4 500 m2
. P14	POIRIER : Collection surgreffée 1979-1980	1 330 m2
. P15	ORNEMENT : Collection variétale : 1980-81-82-83 Cotoneaster sal. floccosus	4 600 m2
. P 16	POIRIER-POMMIER : Collection : 1979 POMMIER : Géniteurs - Présélections : 1981 PORTE-GREFFE : collection : 1981	} 4 900 m2
. P17	ORNEMENT : Cotoneaster sal. floccosus Essais CEE 1981-1982-1983	6 000 m2
. P18	POIRIER : Présélections et Géniteurs : 1981	700 m2
. P19	POIRIER : Hybrides, collection variétale : 1982-1983	1 000 m2
. P20	POIRIER : Hybrides W2 : 1982	1 700 m2
. P21	POMMIER : Golden delicious : 1982	4 750 m2
. P22	POIRIER : Présélections INRA : 1982	7 150 m2
. P23	POIRIER : Hybrides W 3 : 1983	1 200 m2
. P24	POIRIER : Beurré Hardy : 1983	5 900 m2
. P25	POMMIER : Golden delicious : 1982-1983	1 600 m2
. Pépinière 1982	Greffage des hybrides sélectionnés	240 m2

SURFACE TOTALE : 8,5 ha.



Titles of Reports and Posters Presented at the
3rd International Workshop on Fire Blight in Bordeaux, France¹

REPORTS

UNITED STATES

- Aldwinckle, H. S., J. Norelli, S.J. Schwager, and R. C. Lamb.
Evaluation of fire blight resistance of apple cultivars and breeding new resistant cultivars.
- Beer, S. V., D. W. Bauer, and E. M. Steinberger.
Studies on the mechanism of pathogenesis of Erwinia amylovora.
- Beer, S. V., J. L. Norelli, S. J. Schwager, et al.
A risk assessment system for fire blight.
- Beer, S. V., J. R. Rundle, and J. L. Norelli.
Recent progress in the development of biological control for fire blight.
- Beer, S. V., J. R. Rundle, and R. L. Wodzinski.
Interaction between Erwinia amylovora and E. herbicola, in vitro, in immature pear fruits and in apple blossoms.
- Burr, T. J., and J. L. Norelli.
Recent progress in chemical control of fire blight.
- Norelli, J., H. S. Aldwinckle, S. V. Beer, and R. C. Lamb.
Differential virulence of Erwinia amylovora to specific apple cultivars and its implication for breeding and selection of fire blight resistant apple cultivars.
- Norelli, J. and S. V. Beer.
Factors affecting the development of fire blight blossom infections.
- van der Zwet, T., R. L. Bell, and R. C. Blake.
Comparative evaluation of the degree of fire blight resistance in pear cultivars and selections.
- van der Zwet, T. and P. D. Van Buskirk.
Detection of endophytic and epiphytic Erwinia amylovora in various pear and apple tissues.

¹/All reports and poster abstracts will be published in Acta Horticulturae 151 which can be ordered from: Secreatry Gernerall, ISHS, de Dreyen 6, 6703 BC Wageningen, The Netherlands.

FRANCE

Callu, D., et al.

Present situation of fire blight in France (1982-1983).

Gardan, L. and Ch. Manceau.

Persistence of streptomycin on apple and pear.

Le Lezec, M. and J. P. Paulin.

Shoot susceptibility of some apple cultivars in South-West France.

Manceau, Ch., J. P. Paulin, and L. Gardan.

Effects of streptomycin sprays on leaf microflora of pear trees.

Paulin, J. P., R. Chartier, and P. Lecomte.

Leaf scars inoculations of pear trees with Erwinia amylovora.

NETHERLANDS

Maas Geesteranus, H. P.

Survival of epiphytic Erwinia amylovora bacteria and their role in epidemiology.

Meijneke, C. A. R.

The new fire blight control policy in the Netherlands.

Miller, H. J.

Erwinia detection and its significance in survival study.

ENGLAND

Billing, E.

Principles and application of fire blight risk assessment systems.

Billing, E.

Studies on avirulent strains of Erwinia amylovora.

Gwinn, D. C.

Fire blight in perry pears and cider apples in the South-West of England.

WEST GERMANY

Mappes, D.

Trial results with a new copper formulation for the control of fire blight.

Zoller, W.

Further control experiment against fire blight in the Federal Republic of Germany.

Zoller, W.

Biochemical aspects of EPS of Erwinia amylovora.

ITALY

Calzolari, A., et al.

Surveys for the presence of fire blight in some Italian fruit growing areas.

Mazzucchi, U., C. Bazzi, G. Coti, C. Gasperini, A. Calzolari.

Detection of Erwinia amylovora contaminating apple twigs during the dormant season.

BELGIUM

Vantomme, R., et al.

Summary of the research of Erwinia amylovora.

SWITZERLAND

Grimm, R.

Actual situation of fire blight control in Zwtzerland.

SPAIN

Sampayo, M. and I. Palazon.

Prevention against fire blight in an uncontaminated country, Spain.

EAST GERMANY

Kleinhempel, H., H. Kegler, W. Ficke, and H. J. Schaeffer.

Methods of testing apples for resistance to fire blight.

EGYPT

Abo El Dahab, M. R., M. A. El Goorani, H. M. El-Kasheir, et al.

Severe outbreaks of fire blight in Egypt during 1982 and 1983 seasons.

POSTERS

FRANCE

Balavoine, P., and D. Callu.

Climate and fire blight in the North of France (1972-1983).

Boue, H.

Climate and fire blight in the Garonne Valley (1978-1983).

Cadic, A.

Pyracantha breeding program.

Jacquart, C., J. P. Paulin, D. Payen, and E. Billing.

Climatic assessment of the risks of fire blight at bloom.

Laure, P., C. Desbons, and P. Lecomte.

Observation on activity of pollinating insects on fire blight host plants in the DAX area.

LeComte, P., P. Laure, and J. P. Paulin.

Climate and fire blight in the DAX area (1977-1983).

Lespinasse, Y., and J. P. Paulin.

Apple breeding program for fire blight resistance.

Paulin, J. P., and G. Lachaud.

Comparison of the efficiency of some chemicals in preventing blossom infection.

Thibault, B., and H. P. Maas Geesteranus.

Pear breeding for fire blight resistance.

NETHERLANDS

Kooistra, T., and J. de Gruyter.

Efficacy of bactericides against Erwinia amylovora tested on flowering Cotoneaster species.

van der Scheer, H. A. Th.

The experimental garden for research on fire blight at Ouwerkerk, The Netherlands.

van Teylingen, M. and C. A. R. Meijneke.

Applicability of the Billing system for spray warnings.

ITALY

Bazzi, C., M. Gasser, and U. Mazzucchi.

Weather analysis with Billing's spring system in relation to the potential risk of fire blight outbreaks in Italy.

Fideghelli, C., et al.

Breeding program for fire blight resistance by the Istituto Sperimentale per la Frutticoltura.

Mazzucchi, U., C. Bazzi, G. Coti, C. Gesperini, and A. Calzolari.

Detection of Erwinia amylovora contaminating apple twigs during the dormant season.

BELGIUM

Deckers, T. and W. Porreye.

Chemical control of Erwinia amylovora in pear orchards.

DENMARK

Dinesen, I., E. Friis, and J. E. Olesen.

Climate and fire blight. Billing's "system I" tested under Danish conditions and computerized for operation use.

POLAND

Sobiczewski, P.

Study on fire blight forecasting.

CANADA

Bonn, W. G.

Efficacy of bactericides for the control of fire blight of pears.

UNITED STATES

Bell, R. L. and T. van der Zwet.

Recent advances in the USDA pear breeding program.

PRESENT STATUS AND NEW OCCURRENCES
OF FIRE BLIGHT

UNITED STATES AND CANADA

MISSOURI

We have detected streptomycin resistance in 3 orchards in West central Missouri. Eleven of twenty-eight isolates were resistant to 500 ppm streptomycin. Of these, 5 were avirulent and 6 were virulent. We do not as yet know how persistent the problem is or how extensive it is from a geographic point of view. We have the impression that the problem has had tenure of about 3 seasons.

We plan to reexamine and survey the area intensively in the 1984 spring season.

R. N. Goodman
Univ. of Missouri

ILLINOIS

Fire blight was not severe in Illinois in 1983. Growers with minor amounts of the disease in limited acreages are advised to remove all infected wood beginning in mid-August. Removal at that time does not stimulate additional tree growth and the disease will not spread at this time of year. Removal of "strikes" now will reduce inoculum for 1984. Strikes are also easier to find now than during dormancy.

S. M. Ries
Univ. of Illinois

NEW YORK

Fire blight was generally not severe in N.Y. State in 1983. Few of 120 pear and apple orchards surveyed had more than 50 blossom infections and only 2 had 500 or more. For the proper testing of our predictive system we need a season with more extensive and widespread infection.

S. V. Beer
Cornell Univ.

UTAH

Fire blight was serious this year in Utah, especially on apples. Fire blight is usually more serious on pears, but because of weather conditions at the time of the flowering of apples we had a real epidemic. The prediction model based on 62° F mean temperature was

accurate. Within 3 days after a mean temperature of 64° F, we detected E. amylovora in apple flowers. Fire blight symptoms were first observed 10 days later. Growers who sprayed, based upon our warning, had very little disease.

S. V. Thomson
Utah State Univ.

NORTH CAROLINA

In North Carolina, during the 1983 season, fire blight occurrence was very scattered, causing little or no economic damage, except were it occasionally affected young apple trees.

D. F. Ritchie
N.C. State Univ.

CALIFORNIA

Fire blight in 1983 in California pear orchards occurred to the least extent in the last 12 years. This was in spite of record spring rainfall and in spite of the existence of many holdover cankers left from the previous season's severe epidemic in one district (Lake County).

Since it was predictable on the basis of low average temperature and low accumulated degree hours over 65° F that blight would be minimal in all districts in 1983, numbers of treatments applied in 1983 were also at a 12 year low. In spite of the reduced copper treatment schedule followed in 1983, fresh market quality was the worst in 12 years. Growers applying needless copper treatments during cool weather did suffer the most severe russet. However, weather alone was practically enough to knock California out of the fresh market picture in regards to russetting in 1983.

With the low incidence of blight in 1983, time spent by orchardists in the removal of old infections has been correspondingly low. Consequently the blight that did occur in 1983 still largely remains in the orchards and we will start the 1984 season with a good inoculum load, as usual.

B. Zoller
The Pear Doctor, Inc.

SOUTH CAROLINA

The 1983 season was characterized by fire blight occurring late between June 1 and June 15 on apples in South Carolina. An unusual instance of fire blight was noted on the variety 'Granny Smith' apparently in association with crown rot and shot-hole and Bostrychid beetles.

W. Miller
Clemson Univ.

OREGON

The 1983 season was very mild for fire blight in the Medford pear district, presumably due to cool temperature during bloom. Two interesting incidents were observed, however. A block of 'Starkrimson' ('Red Clapp's Favorite') showed many new strikes during bloom, when temperature hadn't come near to a 60° mean. This was in the presence of many holdover cankers in the trees. In another block of 'Bosc' and 'Comice' pears, limbs without cankers were found in late spring oozing fluid through entry holes of the shothole borer, staining the bark brown. These stains were used as a guide in removing infected limbs. No holdover cankers were found, although there had been blight removed from this orchard in previous years.

D. Sugar
S. Oreg. Expt. Sta.

GEORGIA

No blight worth mentioning in 1983.

The following is a delayed report for 1982:

Fire blight started in early March in an apple clone we had brought up from the Old Fort Valley Station. From this start, the fire blight moved south into an adjacent block of three-year-old apple seedlings. Many of these young seedlings bloomed! Precocity was due to crabapple parentage, primarily Malus atrosanguinea. Inoculation was usually, but not exclusively, through blooms. The matter of biggest interest is that these seedlings had been challenged to E. amylovora when very young. Possible explanations:

1. Failure of inoculation/reinoculation technique.
2. Differences between susceptibility when very young and when in 3rd leaf.
3. Increased susceptibility and/or screening or pathotypes in open blooms.

The inoculum spread through apples scattered over 20 acres wherever susceptible genotypes existed and ruined several promising selections that had not been tested before. It got all over 4- and 5-year-old trees of 'Mollie's Delicious' as usual. I keep hoping to find a resistant sport in 'Mollie's Delicious' but then that hope hasn't worked out in 'Bartlett' too well, has it?

J. M. Thompson
S.E. Fruit & Tree Nut
Research Station

ONTARIO

This year less fire blight was observed than 1982, also a light disease year. In contrast to previous years, the disease was mostly restricted to pears. Weather conditions weren't exactly favorable for blight in 1983. An unusual occurrence of fire blight was observed in the Niagara region of Ontario this past summer. In mid-July, pear fruit were found to be oozing with bacteria; however, there was little shoot or sucker blight and old cankers did not appear to be active. This fruit blight phase continued through August and into September. The most susceptible cultivars were 'Flemish Beauty', 'Clapp Favorite', and 'French Bartlett'. Weather conditions leading up to the first observations in July were a cool and wet May, a normal June, and a hot and dry July.

W. G. Bonn
Agr. Can. Res. Sta.

NOVA SCOTIA

A severe outbreak of fire blight of apples occurred on several cultivars of one-year-old whips in a local nursery. This is the first authenticated identification (confirmed by Harrow Research Station) of fire blight on apples in Nova Scotia. Until now, fire blight on apples had been confirmed to a few reports of the presence of typical fire blight cankers. The canker phase often occurs on pears and one outbreak was observed on five trees in 1983.

R. G. Ross
Agr. Can. Res. Sta.

OTHER COUNTRIES

MEXICO

Fire blight has been reported from the following hosts in these regions:

<u>Regions</u>	<u>Host</u>
State of Morelos	Pear and Crataegus
State of Mexico	Pear, Apple and Quince
State of Zacatecas	Pear and Apple
State of Chihuahua	Pear and Apple
State of Puebla	Pear and Apple
State Of Midroacan	Pear

L. Fucikovsky
Centro de Fitopath.
Chapingo

NETHERLANDS

Spring 1983 has been very unfavourable for the development of the disease in The Netherlands. It was cold and wet until after the blossoming period of pears, apples and hawthorns, resulting in very few blossom-infections in these genera. The temperature rose, however, in the second half of June, causing a lot of blossom infection in the wide-spread broad-leaved Cotoneaster shrubs, which were just blossoming at that time. Later, shoot infection in other host plant genera resulted from this mass inoculum.

Tracing and roguing of infected plants in 20 protected area's as well as in a number of special cases (e.g. in zones around orchards) outside these regions went on continuously. In some of these protected areas and zones scarcely any hawthorn or Cotoneaster is left after several years of this type of action. Remaining hawthorns have to be cut back regularly in order to prevent blossoming. Planting of the most susceptible hostplants (Crataegus, Stranvaesia and the broad-leaved Cotoneaster species) will be forbidden in these area's starting in 1984.

C. A. R. Meijneke
Plant Protect. Serv.

WEST GERMANY

In the northern part of Germany, the weather was extremely dry and hot during the summer time. Infections were very low; only in nurseries with artificial irrigation, severe attack mainly on ornamentals (especially Cotoneaster species) could be observed. With the exception of Bavaria in the south, fire blight has been spreading considerably, in particular Cotoneaster salicifolius floccosus was heavily affected.

W. Zoller
Biol. Bundesanstalt
Heikendorf

In 1983, incidence of fire blight was again very low in southwestern Germany. However, the disease is still spreading.

E. Seemuller
Biol. Bundesanstalt
Dossenheim

ENGLAND

Hawthorns were again affected in some areas largely because of rain dispersal of inoculum during bloom plus progression of 1982 infections. Where pears were affected, this was usually related to progression of undetected 1982 infections or proximity to infected hawthorns; some summer blossom infections were seen. Apple blossom and shoot infections were largely confined to late flowering cider apple cultivars; weather was cool and wet during most of the apple blossom period.

E. Billing
East Malling Res. Sta.

FRANCE

1. General tendencies

In spring, weather has been generally cool and wet, with short bloom period, especially for pears and apples. Summer (particularly July and August) has been more favourable to fire blight, with extremely warm and stormy periods in several places.

2. Fire blight in previously contaminated area

- noticeable extension in the North focus which extends in Haute Normandie (South of the previously known zone) on cider apple (for the first time in France).
- the generalization along the Rhine Valley on Cotoneaster (mainly).
- slight increase of the contaminated area in the Garonne Valley, both East- (Agen) and Westward (Langon). Isolated cases in spots in the Dordogne and Lot Valleys.

3. New zones

a) Two important new areas with fire blight on pears ('Passe-Crassane') have been detected in summer: Orleans, where several ha of 'Passe Crassane' have been uprooted after fire blight has been recorded (on secondary blossoms in June). In Ile de France (20 km North of Paris) where 11 ha of orchard ('Passe-Crassane') were found very severely affected in August. The stormy weather (June-July) very warm, is probably responsible for a rapid extension with these zones, and

b) Several records in autumn on ornamentals in new places:

- Maine et Loire on Pyracantha, on a single hedge
- Charentes (South of Angoulême) in nursery plant material
- Limoges on ornamentals.

J. P. Paulin
INRA, S.P.V.

NEW ZEALAND

No new occurrences of fire blight. Minor isolated outbreaks of twig blight on apples and Cotoneaster. More prevalent in Hawkes Bay then in Nebo and Central Otago orchards.

C. N. Hale
D.S.I.R., P.D.D.

SWITZERLAND

So far no fire blight has been detected in Switzerland. Spring 1983 was wet and cold and the summer hot and dry. The rigorous quarantine measures were continued, also the efficient inspection service for export nurseries.

In 1983, about 250 samples of suspected plants were tested for fire blight in the laboratory of bacteriology. If bacterial pathogens were found, mostly Pseudomonas syringae could be identified.

R. Grimm
Swiss Fed. Res. Sta.

ITALY

Up until now, no cases of fire blight have been found in Italy.

C. Bazzi
Instit. Patol. Veg.

ROMANIA

Fire blight has not been found in Romania.

V. Severin
Res. Inst. for Pl. Prot.

GREECE

Extensive surveys were conducted in nurseries and orchards in fruit tree growing areas. No fire blight symptoms were observed.

P. G. Psallidas
Ben. Phytopath. Inst.

SPAIN

Until now, no cases of fire blight have been found in Spain.

M. C. Noval Alonso
I.N.I.A., Prot. Veg.

PORTUGAL

Fire blight has not yet been found in Portugal.

J. M. S. Martins
Est. Agron. Nac.

IRELAND

Fire blight has not been recorded in Ireland.

P. F. Walsh
Dept. of Agric.

SWEDEN

No fire blight has been found. A survey is carried out every summer in the southern parts of Sweden. Import restrictions; no fire blight hosts are allowed; inspections in the nurseries.

M. Graberg
Nat. Board of Agric.

NORWAY

Fire blight has still not been observed in Norway. If the disease should be brought into the country, for example with imported nursery products, one fears that the climatic conditions will not be an obstacle to its establishment in certain areas. Consequently, importation of the chief host plants of fire blight, from countries considered to be contaminated by the disease, is prohibited.

H. Roed
Norw. Pl. Prot. Inst.

AUSTRALIA

Fire blight has not been found within Australia and stringent plant quarantine measures apply to prevent its entry.

D. N. Cartwright
S. Austr. Dept. of Agric.

DETAILS ON CURRENT FIRE BLIGHT RESEARCH

REPORTED FROM SOME UNIVERSITIES AND EXPERIMENT STATIONS

NETHERLANDS

The efficacy of six compounds in one spray after inoculation with E. amylovora (10^7 cells/ml), were tested on flowering Cotoneaster dammeri 'Coral Beauty'. In the preventive trials, Kasumin 25% wp (kasugamycin), MBR 10995 (50% experimental bactericide), Plantomycin (streptomycin), Tri-Miltox forte NC (Mancozeb, coppersulphate, copperoxychloride, coppercharbonade) and Koper Bayer (copperoxychloride) was determined exclusively by the copper content of the treatment and not by the compound. In the curative test, Kasumin has shown to be more active than the other investigated products namely Plantomycin.

In trials under natural infection conditions on Cotoneaster salicifolius cv. floccosus repeated treatments with kasumin, Tri-Miltox forte NC and Kiper Bayer gave sufficient control of flower infection. In the advised dosage, Copac E was not effective.

In phytotoxicity trials Copac E and Koper Bayer, applied a the same copper dosage, were equally phytotoxic on Malus 'Golden Hornet', Stranvaesia davidiana, Cotoneaster bullatus and seedlings of Malus communis and Sorbus aucuparia. In the advised dosage, Tri-Moltox forte NC and Kasumin 25% wp were less phytotoxic than Koper Bayer on Malus 'Golden Hornet' and Cotoneaster bullatus. On pear, 'Conference' and 'Clapp's Favorite', Kasumin 25% wp gave too much leaf damage.

T. Kooistra
Wageningen

Trials on the survival of E. amylovora bacteria on plant part surfaces and on dead materials were continued to investigate the necessity of disinfection. Except for the ooze itself, survival of free living bacteria or bacteria clustered in strands does not extend a period of 24 hours.

H. P. Maas Geesteranus
Wageningen

WEST GERMANY

Because of toxicological aspects, the further work with the very effective compound CGA 78 039 had to be stopped. Alternatively, spray experiments were undertaken with Copac E, a product with a very low Cu concentration. First results showed a good effect against artificial shoot infections on pear (up to 70% efficiency) but low effect against blossom infections on Cotoneaster salicifolius floccosus. Breeding for resistance in the highly susceptible Cotoneaster species C. salicifolius and C. watereri were continued. Five from 15 lines showed a low degree

of susceptibility and will be further worked with. The resistance studies with an assortment of pome fruit varieties will be continued on the test plot near Bornhoved.

The weather system of BILLING was tested in the north of Germany in the fruit free area of the "alte Land" and will be continued in the next year (Baumm, Univ. of Hamburg). A comparison of different epidemiological methods has been undertaken in the south of Germany in Baden-Wurtemberg (Schili, University of Stuttgart-Hohenheim)

W. Zoller
Heikendorf

ENGLAND

From studies reported on other Enterobacteriaceae it appears that some non-capsulated phage-resistant variants of E. amylovora lack the enzyme UDP-Gal-4-epimerase.

Billing's risk assessment systems gave useful warning of risks in 1982 and 1983 and reflected subsequent events well.

E. Billing
East Malling

Cell surface contact was required between virulent bacteria and slices of immature pears to induce leakage of pear electrolytes and maintain bacterial growth. Enhanced production of outer membrane component of bacteria reduced loss of pear electrolytes, and inhibited disease in inoculated susceptible apple plants.

R. C. Hignett
East Malling

BELGIUM

Further investigations are made into the role of the honeybee in the dissemination of fire blight. Besides research on the spread of the bacteria by the honeybee while visiting flowers, the overwintering of the bacteria in a beehive is investigated.

D. Van Laere
Res. Sta. for Nemat.

FRANCE

Studies on genetical aspects of pathogenicity are presently beginning in Institut National Agronomique (Pathologie Vegetale - Prof. Coleno) by A. Kotoujansky and J. Vanneste, in cooperation with INRA-Angers.

J. P. Paulin
Angers

ITALY

Testing of plant material imported from abroad (Ministerial Decree, 23/XII/1983) for presence of E. amylovora.

Breeding program for fire blight resistance by the Istituto Sperimentale per la Frutticoltura (Rome, Italy).

C. Bazzi
Bologna

SPAIN

Regular screenings of fruit-growing areas and forest with abundant hawthorns.

Systematic samplings of imported plant material likely to carry Erwinia amylovora.

Conducting various kinds of studies: fire blight risk evaluation in Spanish fruit-growing areas, bactericide phytotoxicity studies on vegetation and along the fertilization process, studies on the sensitivity of native varieties to the disease.

M. C. Noval Alonso
Madrid

NEW ZEALAND

Survival of epiphytic Erwinia amylovora on natural apple and pear fruits and methods for disinfestation. This project is partly funded by the New Zealand Apple and Pear Marketing Board in conjunction with the Department of Scientific and Industrial Research. The aim of the project is to provide export fruit which does not carry Erwinia amylovora.

C. N. Hale
Auckland

NEW YORK

Mutants of Erwinia amylovora that are altered in pathogenicity towards rosaceous hosts, express differential virulence towards apple cultivars or fail to induce the hypersensitive reaction in tobacco, are being produced by transposon mutagenesis. Preliminary results indicate that mutants in the three functions have been produced by use of Tn5 in the vehicle pJB4JI. DNA from a mutant deficient in pathogenicity has been isolated and a restriction endonuclease fragment containing the transposon has been identified preparatory to its cloning for use as a probe for isolation of the homologous wild-type gene. A transformation procedure for E. amylovora has been developed by optimizing buffers, pH, additional reagents, temperatures and times of treatment. Its efficiency is considered more than sufficient for planned complementation studies.

Data were collected which indicate that biological control methods for fire blight are possible. The most encouraging technique involves the application of log-phase suspensions of Erwinia herbicola, a nonpathogenic endophytic and epiphytic bacterium. Laboratory and field methods were developed for identifying those strains of E. herbicola that are particularly effective in suppressing the development of fire blight of apple blossoms. Of several hundred strains tested by various means, several consistently provided control of blossom infection of apple that is statistically equivalent to that provided by streptomycin. In addition to strain, the concentration, time of application and the physiological state of applied bacteria were found to affect efficacy.

Initially, bacteriocinogenicity was considered in selecting strains of E. herbicola strains for biological control studies. However, field and laboratory experiments indicated that other mechanism are responsible for control of fire blight by E. herbicola. A mechanism based on the utilization of endogenous organic nitrogenous compounds by E. herbicola is supported by the strongest evidence. One bacteriocin (Herbicolacin 112Y) was found to specifically inhibit all wild-type strains of E. amylovora tested. Its mode of action was studied and it was partially purified and identified as a biologically unique compound composed of several amino acid derivatives. Genes for its production (or regulation) were determined to reside on a large indigenous plasmid, based on analysis of DNA from transposon-induced non-bacteriocinogenic mutants, and the transfer of bacteriocin producing ability by conjugal transfer of the wild-type plasmid.

Work continued on the development of a system for the evaluation of the relative risk of the occurrence of fire blight in particular pear and apple orchards in a given growing season. The system takes into account factors peculiar to individual orchard, which affect host susceptibility and the availability of inoculum, and weather conditions that affect the dissemination and multiplication of the fire blight pathogen Erwinia amylovora. A working model was developed that relates weather risk and orchard risk to determine overall risk. Data were collected from 100 orchards in 1982 and 120 orchards in 1983. These data are being used to test and possibly revise the model. Plans have been made to collect additional data in 1984.

Data relating environmental conditions to the development of fire blight blossom infection under precisely controlled conditions indicated that temperature, relative humidity and inoculum dose significantly affect the rate of development of infection.

S. V. Beer
Ithaca

UTAH

Erwinia amylovora was detected almost exclusively on the pistils of epiphytically colonized pear, apple and hawthorn flowers.

S. V. Thomson
Logan

ONTARIO

Current fire blight projects include those on epidemiology involving weather monitoring and disease control using experimental compounds.

G. W. Bonn
Harrow

MEXICO

Epidemiological studies on fire blight in the State of Morelos (Blooming of pear in Sept. Oct. Nov. Dec. Jan. and Feb.). Infection starts in Jan. and Feb.

MISCELLANEOUS NEWS

During late May 1983, Dr. van der Zwet (WVa) was invited to spend 10 days in Egypt, upon invitation by the Ministry of Agriculture, to diagnose and confirm the presence of fire blight on pears in the lower Nile Delta. Upon the first introduction of fire blight (origin unknown) in Egypt in the early 1960s, the disease apparently increased slowly and became widespread and yet unnoticed until recent years. In 1983, unusually late rainstorms during and after bloom (April) appeared to be the main factor initiating primary infection throughout the lower part of the Delta region. Fire blight was found widespread and quite severe just south of Alexandria in Behera Governorate, the principal region of low chilling pears, predominantly of the 'Le Conte' variety. The prevailing desert climate between April and November is expected to be very effective in reducing further spread of the disease.

Earlier in May, Dr. Zeller visited the University of Alexandria, Egypt. On several trips in the pear orchards he observed heavy fire blight infections, mostly on blossoms on the variety 'Le Conte'. Sometimes a strong ooze production was noted. Accordingly, an Egyptian student shall prepare her Masters thesis on fire blight in Heikendorf at the Biologische Bundesanstalt.

During the summer of 1983, Dr. Bonn (Harrow), spent 3 months in the laboratory of Dr. Paulin at INRA, Angers in France. His interests were serology and fire blight forecasting, two areas of research where the INRA laboratory has expertise. He enjoyed the hospitality of the French very much.

In September 1983, Dr. Sherm Thomson, Utah State University, Logan, visited Mt. Albert Research Station in New Zealand and presented a seminar on fire blight in the USA.

In September 1983, following the workshop on fire blight in Bordeaux, Dr. van der Zwet visited fruit research stations in Nyon and Wädenswil, Switzerland, in Lana and Laimburg, Italy (South Tirol), and in Bavendorf, Dossenheim (BBA), and Limburgerhof (BASF), West Germany. En route, he presented two invitational seminars in German: "Feuerbrand und die Möglichkeiten seiner Bekämpfung" at the Federal Research Station for Fruit Growing in Wädenswil and "Stand und Massnahmen der Feuerbrand Wirtschaft und für Resistenter Apfel und Birnensorten im Nord Amerika" at the Institute for Plant Protection of the University of Hohenheim near Stuttgart.

Presently, Dr. Klement (Budapest) is an invited visiting professor in the Institute für Pflanzenpathologie und Pflanzenschutz der George August Universität in Göttingen, West Germany (Sept. 1983-Sept. 1984).

Currently, Dr. Steve Beer (Cornell) is on a 3-month sabbatic at the Microbiologisches Institut, Swiss Federal Technical University (ETH), Zurich. He is working on molecular biology of bacteria and lecturing on phytobacteriology. Some cooperative work on fire blight with Dr. Richard Grimm in Wädenswil (Jan. - Sept. 1984).

Mrs. Jacob Conceicao, of the Portuguese Plant Protection Service, is now specializing in Plant Bacteriology. She will be responsible for the survey of bacterial plant diseases in her institution, thus becoming one more person in this country whose professional activity is concerned with the fire blight problem.

Joel Vanneste, presently training in genetics at I.N.A. Paris, will be included in the Research Staff of Angers Pathology Station (INRA) after he completes his thesis (2 years).

Dr. Douglas W. Dye, Head of the Bacteriology Section, Plant Disease Division, D. S. I. R., retired on December 16, 1983. Work on fire blight is now under the direction of Dr. Chris Hale, who has succeeded Dr. Dye as head of the Bacteriology Section.

Dr. Eve Billing retired from her post at East Malling Research Station on 31 May 1984 on reaching the age of 60. This is now the rule. At present she is a part-time consultant to the Ministry of Agriculture Fisheries and Food advising on the application of risk assessment systems. Her present aim is to round off work on the systems and on host parasite relationships and write it up. Limited writing and lecturing on other aspects of plant bacteriology is also proposed.

At present there is no sign of a replacement full-time worker on fire blight at EMRS but hopefully some work will continue there and elsewhere in spite of current financial restraints in agricultural research.

FUTURE MEETINGS

April 4

The Association of Applied Biologists in the U.K. is organizing a meeting on fire blight in London. It is primarily concerned with experience of the disease in England. No one is now working full-time on fire blight but about 30 people in research institutes, universities and the Agricultural Development and Advisory Service have spent a small proportion of their time on some aspect of the disease in recent years.

July 16-18

National Congress of the Mexican Phytopathological Society in San Luis Potosi, Mexico.

August 12-16

Annual meeting of the American Phytopathological Society in conjunction with the Canadian Phytopathological Society; University of Guelph, Guelph (Ontario), Canada.

June 2-7, 1985

Sixth International Conference on Plant Pathogenic Bacteria; Center of Adult Education, University of Maryland, College Park, MD. Contact: Dr. E. L. Civerolo, USDA Fruit Laboratory, Room 111 Bldg 004, BARC-W, Beltsville, MD 20705.

August 11-15, 1985

Annual meeting of American Phytopathological Society; MGM Grand Hotel, Reno, Nevada.

August 11-20, 1986

22nd International Horticultural Congress, University of California, Davis.

September 1986

4th International Workshop on Fire Blight, to be held at Cornell University (Ithaca) and at the N.Y. State Agricultural Experiment Station (Geneva) with tours arranged afterwards to surrounding experiment Stations (Harrow, Beltsville, Kearneysville). First announcements will be mailed in September 1984.

NEW THESES AND DISSERTATIONS ON FIRE BIGHT

Alberto Mendoza Herrera

"Identificación y Evaluación de Problemas Fitopatológicos del Peral (Pyrus communis L.) en el Elido Ocoxaltepec", Ocuiluco, Morelos. M.S. Thesis, Colegio De Postgraduados, Chapingo, Mexico, 1983.

Pascale Garret

"Contribution a la mise au point d'un test de sensibilite a Erwinia amylovora applicable a la selection in vitro de plants résistantes au Feu Bacterien", 43 p, Ecole Nationale Supérieure Agronomique Femine, Rennes, Septembre 1983.

Joel Vanneste

"Etude du plasmide d'Erwinia amylovora-Son roe dans le pouvoir pathogene." Diplome d'Étude Approfondie, Fac. Sci. Univ. Paris XI, 1983.

Giuseppe Coti

"Messa a punto di un metodo per il rilevamento dei germi di Erwinia amylovora su materiale asintomatico." M.S. Thesis, Univ. of Bologna, Italy, 1984.

Alia Shoeib

"Studies on fire blight disease of pears." M.S. Thesis, University of Alexandria, 1984.

Rizaldo Bayot

"Role of Flagella Motility in Apple Blossom Invasion and Tactic Response to Various Plant Nectar Extracts by Erwinia amylovora." Ph.D. Dissert., Univ. Illinois, 1984.

Michael Klopmeier.

"Motility and Chemotaxis of Erwinia herbicola." Ph.D. Dissert., Univ. of Illinois, 1984.

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LIST OF PERSONS INTERESTED IN FIRE BLIGHT 1/

Abdel-Rahman, M., Fertilizer-Chemical Division, Agway Inc., P.O. 4933, Syracuse, New York 13221. (315-477-6176)	(1)	USA
Abo-El-Dahab, M. K., Plant Pathology Dept., Faculty of Agric., Univ. of Alexandria, Alexandria, Egypt (71960)	(1)	EGY
Agriculture Canada, Library, Records Div., Ottawa, Ontario KIA 0C5, Canada	(2)	CND
Aldwinckle, H. S., Department of Plant Pathology, N.Y. State Agric. Expt. Station, Geneva, New York 14456. (315-787-2317)	(1)	USA
Alston, F. H., Fruit Breeding Department, East Malling Research Station, East Malling, Maidstone, Kent, ME19 6BJ, England. (0732-843833)	(1)	UK
Andersen, H., The Government Plant Protection Service, Gersonsvej 13, 2900 Hellerup, Denmark. (01-620787)	(1)	DK
Ark, P. A., St. Pauls Towers, 100 Bay Place, Apt. 1915, Oakland, California 94610. (415-835-4700, ext. 298)	(4)	USA
Arsenijevic, M., Faculty of Agriculture, Institute for Plant Protec., V. Vlakovica 2, 21000 Novi Sad, Yugoslavia. (021-58-366)	(3)	YUG
Balavoine, P., Service de la Protection des Vegetaux, Cite Administr., 59048 Lilla, France.	(2)	FR
<u>Barrat</u> , J. G., West Va. University Expt. Farm, Kearneysville, West Virginia 25430. (304-876-6353)	(1)	USA
Bates, J. J., Biological Research Center, Imperial Chemicals Inc., P.O. Box 208, Goldsboro, North Carolina 27530. (919-736-3030)	(2)	USA
Baum, L. H., Institute fur Angewandte Botanik, Univ. of Hamburg, Marseillerstrasse 7, 2000 Hamburg 36, West Germany (040/5 11.89.12)	(1)	BRD

1/ Names underlined are contact persons for preparation of fire blight newsletter. Numbers in parentheses following addresses are local telephone numbers, and those in column at right indicate activity or interest in fire blight:

1. Actively engaged in fire blight research;
2. Indirectly interested in fire blight;
3. Interested in fire blight, but located in region where disease is not present;
4. Retired but still interested in fire blight activities.

- Baykal, N., Agric. Univ. Ziraat Fakultesi, Fitopatoloji Kursusu, Ankara, Turkey. (3) TUR
- Bazzi, C., Laboratorio Fitobatteriologia, Istituto Patol. Vegetale, via Filippo Re 8, 40126 Bologna, Italy. (051-236175) (3) ITA
- Beer, S. V., Department of Plant Pathology, Cornell University, Ithaca, New York 14853. (607-256-3259) (1) USA
- Bell, R. L., U.S. Department of Agriculture, Appalachian Fruit Research Station, Rt. 2, Box 45, Kearneysville, West Virginia 25430. (304-725-3451, ext. 21) (1) USA
- Benjama, A., Laboratoire de Phytiairie et Phytobacteriologie, Institut Nationale de la Recherche Agronomique, B.P. 415, Rabat, Morocco. (3) MOR
- Bennett, R. A., Redditch College, Peakman Street, Redditch, Worcester B98 8DW, England (2) UK
- Bergna, D. A., Estacion Experimental Alto Valle, Casilla de Correo 52, 8332 General Roco, Rio Negro, Argentina. (0941-22248) (3) ARG
- Berry, D. W., Jackson County Extension Office, 1301 Maple Grove Drive, Medford, Oregon 97501. (2) USA
- Beutel, J. A., Department of Pomology, University of California, Davis, Calif. 95616. (916-752-0507) (1) USA
- Biehn, W., Ciba Geigy Corporation, R + D Agric. Div., Box 11422, Greensboro, North Carolina 27409. (2) USA
- Biggs, A. R., Agriculture Canada, Research Station, Vineland, Ontario LOR 2E0 (416-562-4113) (2) CND
- Billing, Eve, 4 Fromandez Drive, Horsmonden, Tonbridge, Kent TN12 8LN, England (089-272-2807) (1) UK
- Bolay, A., Section de Phytopathologie, Station Federale de Recherches Agronomiques de Changins, 1260 Nyon, Switzerland. (022-615451) (3) SWT
- Bonn, W. G., Agriculture Canada, Research Station, Harrow, Ontario NOR 1G0, Canada. (519-738-2251) (1) CND
- Bouma, S., Research Station for Arboriculture, P.O. Box 118, 2770 AC Boskoop, The Netherlands. (01727-3220) (1) NL
- Bredemeier, D., Universidade Federal de Santa Maria, Departamento de Fitotecnia, 97-100 Santa Maria, Rio Grande do Sul, Brazil. (3) BRA
- Brulez, W., Biologische Bundesanstalt, Institut fur Pflanzenschutz, Schlosskoppelweg 8, 2305 Heikendorf, West Germany. (0431-23495). (1) BRD

Burkowicz, A., Institut Sadownictwa, 83-111 Milobadz, Poland.	(1)	POL
Burr, T. J., Department of Plant Pathology, N.Y. State Agric. Expt. Station, Geneva, New York 14456. (315-787-2312)	(2)	USA
Bushong, J. W., Agrichemicals Div., 3M Center, Bldg 223-IN-05, 3M Company, St. Paul, Minnesota 55144 (612-736-0930)	(2)	USA
Button, J., Box 86, Ceres 6835, Republic of South Africa.	(3)	SA
Byrde, R. J. W., Long Ashton Research Station, Bristol BS18 9AF, England. (027-580 2181)	(1)	UK
Callu, D., Service de la Protection des Vegetaux, Cite Administr., 67000 Strasbourg, France	(2)	FR
Calzolari, Alessandra, Osservatorio per le Malattie delle Piante, Via di Corticella 133, 40129 Bologna, Italy. (051-352917)	(3)	ITA
Cameron, H. R., Department of Botany & Plant Pathology, Oregon State University, Corvallis, Oregon 97330. (503-754-4044)	(2)	USA
<u>Cao</u> , R., Department of Plant Protection, Zhejiang Agricultural University, Hangzhou, Zhejiang, Peoples Republic of China. (42605)	(3)	CHI
Carlson, R. F., Department of Horticulture, Michigan State University, East Lansing, Michigan 48823. (517-355-5200)	(2)	USA
Carroll, V. J., Chemicals Division, Pfizer Inc., 235 East 42nd Street, New York, New York 10017. (212-573-2643)	(1)	USA
<u>Cartwright</u> , D. N., Plant Quarantine Div., South Austr..Dept. of Agric., Box 1671, G.P.O., Adelaide, South Australia 5001. (08-2660911)	(3)	AUS
Cazelles, O., Station Federale de Recherches Agronomique de Changins, 1260 Nyon, Switzerland.	(3)	SWT
Centre for Agricultural Publishing and Documentation, P.O. Box 4, 6700 AA Wageningen, The Netherlands.	(2)	NL
Chandler, D., 1006 S. 32nd Avenue, Yakima, Washington 98902. (509-253-3414)	(2)	USA
Chouibani, M., D.P.V.C.T.R.F., B. P. 1308, Rabat, Morocco	(3)	MOR
Christensen, F. G., The Royal Veterinary and Agricultural University, Arboretum, 2970 Horsholm, Denmark. (02-860641)	(2)	DK

- Chronica Horticulturae (Editor), Geertjesweg 106, 6706 EE
Wageningen, The Netherlands. (2) NL
- Civerolo, E. L., Fruit Laboratory, U.S. Department
of Agriculture, Room 111, Building 004, BARC-West,
Beltsville, Maryland 20705. (301-344-4651) (2) USA
- Clayton, C. N., Department of Plant Pathology,
North Carolina State University, Raleigh, NC 27607.
(919-737-2721) (4) USA
- Cline, R. A., Horticulture Research Institute of Ontario,
Vineland Station, Ontario LOR 2E0, Canada.
(416-562-4141) (2) CND
- Conceicao, J., Direccao General de Protecacao da Producao
Agricola, Tapada da Ajuda, 1300 Lisbon, Portugal. (3) POR
- Cooper, R. M., School of Biology Sciences, University of Bath,
Claverton Down, Bath, Avon BA2 7AY, England (1) UK
- Cornils, H., Inst. fur Angewandte Botanik, Univ. of Hamburg,
Marseillerstr. 7, 2000 Hamburg 36, West Germany.
(040-4123-2359) (1) BRD
- Coulombe, L. J., Agriculture Canada, P.O. Box 457,
St. Jean, Quebec J3B 6B8, Canada. (514-346-4494) (2) CND
- Covey, R. P., Tree Fruit Research Center, 1100 North
Western Avenue, Wenatchee, Washington 98801.
(509-663-8181) (1) USA
- Crassweller, R. M., Cooperative Extension Service, University
of Georgia, Athens, Georgia 30602. (404-542-2861) (2) USA
- Crowe, A. D., Agriculture Canada, Tree Fruit Section,
Research Station, Kentville, Nova Scotia B4N 135, Canada.
(902-678-2171) (2) CND
- Cummins, J. N., Department of Pomology & Viticulture,
N.Y. State Agr. Expt. Station, Geneva, New York 14456.
(315-787-2233) (1) USA
- Dale, T., Norwegian Plant Inspection Service, P.O. Box 94,
Okern, Oslo 5, Norway. (02-224760) (3) NOR
- Davidson, J. G. N., Agriculture Canada, Research Station,
Box 29, Beaverlodge, Alberta T0H 0C0, Canada.
(403-354-2212) (2) CND
- Davidson, S. H., 408 Troy Avenue (Woodcrest),
Wilmington, Delaware 19804. (302-994-1875) (4) USA
- Deckers, T., Opzoekingsstation van Gorsem, Brede Akker 3,
3800 St. Truiden, Belgium. (011-682019) (1) BLG

- De Ley, J., Lab. voor Microb. en Microb. Genetica, Rijksuniv. (1) BLG
Gent, K. L. Ledeganckstr. 35, 9000 Gent, Belgium.
(22-78-21)
- Dinesen, A., Botany Department, State Plant Pathology Institute, (2) DK
Lottenborgvej 2, 2800 Lyngby, Denmark. (0287-2510)
- Dobra, A., Catedra de Fitopatologia, Facultad de Ciencias (3) ARG
Agrarias, Universidad Nacional del Comahue, 8303
Cinco Saltos, Argentina.
- Douglas, S. M., Dept. of Plant Pathology, Conn.Agric. Expt. (2) USA
Sta., New Haven, Conn. 06504 (203-789-7222)
- Drake, C. R., Department of Plant Pathology & Physiology, (2) USA
Virginia Polytechnic Institute, Blacksburg, VA 24061.
(703-961-5251)
- Duben, J., Bayer AG, Pflanzenschutzberatung, 5090 Leverkusen, (2) BRD
West Germany.
- Dye, D. W., Plant Diseases Division, Dept. of Scientific (2) NZ
& Industr. Research, Private Bag, Auckland, New Zealand.
(893660)
- Egolf, D. R., U. S. National Arboretum, 3501 New York Ave., (1) USA
Washington, D. C. 20002. (202-472-9277)
- Egli, T., Ciba-Geigy Chem. Company Ltd., AC 2.82, 4002 (3) SWT
Basel, Switzerland.
- Ellis, M. A., Department of Plant Pathology, Ohio Agric. (1) USA
Research and Devel. Center, Wooster, Ohio 44691.
(216-263-3700)
- Ercolani, G. L., Istituto di Microbiologia Agraria e Tecnica, (3) ITA
Facolta di Agraria, Via Amendola 165/A, 70126 Bari, Italy.
(080-339422)
- Erskine, J. M., Inst. of Natural Resources, Univ. of Natal, (3) SA
P.O. Box 375, Pietermaritzburg 3200, South Africa.
(0331-21344)
- Evans, I. R., Plant Pathology Laboratory, 605 Agriculture (2) CND
Bldg., 9718-107 St., Edmonton, Alberta T5K 2C8, Canada.
(403-427-5350)
- Feliciano, Asuncia J. (Connie), EMBRAPA/UEPAE de Cascata, (3) BRA
Caixa Postal 403, Pelotas 96.100, Rio Grande do Sul,
Brazil.
- Fideghelli, C., Istituto Sperimentale per la Frutticoltura, (3) ITA
Via di Fioranello n. 52, Ciampino Aeroporto, 00040
Rome, Italy.

- Fox, R. T. V., I.C.I., Plant Protect. Division, Jealott's Hill Res. Station, Bracknell, Berkshire RG12 6EY England. (0344-24701) (2) UK
- Franz, W., Amt fur Land-und Wasserwirtschaft, Abt. Pflanzensch., Schonbockener Str. 102, 2400 Lubeck, West Germany. (0451-45551) (2) BRD
- French, J. R., FMC Corp., 100 Niagara Street, Middleport, New York 14105. (716-735-3761, ext. 361) (2) USA
- Fucikovsky, L., Centro de Fitopatologia, Colegio de Postgraduados, Escuela Nacional de Agricultura, A.P.#85, 56230 Chapingo, Mexico. (5-85-45-55, ext. 5556) (2) MEX
- Gantotti, B. V., Department of Bacteriology, University of California, Davis, California 95616. (916-756-0283). (1) USA
- Garibaldi, A., Istituto di Patologia Vegetale, Via Giuria 15, 10126 Torino, Italy. (011-6505236) (3) ITA
- Garrett, Connie M. E., Dept. of Plant Pathology, East Malling Research Station, Maidstone, Kent, ME19 6BJ, England (0732-843833) (1) UK
- Gates, D., Agric. Chemicals Div., 3-M Company, 223-1 N.E., St. Paul, Minnesota 55144. (612-736-9476) (2) USA
- Geenen, J., Rijksstation voor Plantenziekten, Burg. van Gansberghelaan 96, 9220 Merelbeke, Belgium. (2) BLG
- Gibbins, L. N., Department of Microbiology, University of Guelph, Guelph, Ontario N1G 2W1, Canada. (519-824-4120, ext. 3477) (2) CND
- Goodman, R. N., Dept. of Plant Pathology, University of Missouri, Columbia, Missouri 65211. (314-882-7043) (1) USA
- Goto, M., Laboratory of Plant Pathology, Faculty of Agriculture, Shizuoka University, 836 Ohya, Shizuoka 422, Japan. (0542-37-1111, ext. 827) (3) JAP
- Graberg, M., National Board of Agriculture, Plant Protection Service, 551 83 Jonkoping, Sweden. (036-16.94.20) (3) SWD
- Graf, H., Obstbauversuchsanstalt, Westerminnerweg 22, 2155 Jork, West Germany. (04162-7511) (2) BRD
- Grimm, R., Federal Res. Station for Fruit-growing, Viticulture and Hortic., 8820 Wadenswill, Switzerland. (01-780.13.33) (3) SWT
- Gupta, G. K., Fruit Pathology Laboratory, Regional Fruit Res. Station, Black Rock, Mashobra, Simla 7, H.P., India. (8261). (3) IND

- Gwynne, D. C., Agricultural Development and Advisory Service, (1) UK
Min. of Agric., Fisheries, and Food, Burghill, Rd.,
Westbury-on-Trym, Bristol BS10 6NJ, England. (0272-500000)
- Hale, C. N., Plant Diseases Div., Dept. of Scientific and (1) NZ
Industrial Research, Private Bag, Auckland, New Zealand
(893660)
- Harnish, W., Agric. Chem. Div., Food & Machinery Corporation, (2) USA
100 Niagara Street, Middleport, New York 14105.
(716-735-3761)
- Heimann, Mary Francis, Dept. Plant Pathology, University (1) USA
of Wisconsin, Russell Labs, 1630 Linden Drive,
Madison, Wisconsin 53706. (608-262-1426)
- Heybroek, H. M., Dorschkamp Research Inst. for Forestry (1) NL
and Landscape Planning, P. O. Box 23, 6700 AA
Wageningen, The Netherlands. (08370-19050)
- Hickey, K. D., Fruit Research Laboratory, Penn. State Univ., (2) USA
Box 309, Biglerville, Pennsylvania 17307. (717-677-6116)
- Hignett, R. C., Dept. of Plant Pathology, East Malling Research (1) UK
Station, Maidstone, Kent ME19 6BJ, England
- Hildebrand, E. M., 11092 Timberline Drive, Sun City, (4) USA
Arizona 85351. (602-977-5326)
- Hoppe, H., Pflanzenschutzamt Hannover, Bez. Stelle Bremervorde, (2) BRD
Neue Str. 22, 2140 Bremervorde, West Germany.
- Horricks, J., Alberta Agriculture, 9718 107 Street, (2) CND
Edmonton, Alberta T5K 2C8, Canada. (403-427-5350)
- Howard, R. J., Alberta Hort. Res. Center, BAG Service 200, (2) CND
Brooks, Alberta T0J 0J0, Canada.
(403-362-3391)
- Hunter, C. L., Soils and Crops Branch, Ontario Ministry (1) CND
of Agriculture and Food, P. O. Box 587, Simcoe,
Ontario N3Y 4N5, Canada. (519-426-7120)
- Isenbeck, Margot, Institut fur Phytopathologie, Universitat (1) BRD
Kiel, Olshausenstr. 40-60, 2300 Kiel, West Germany.
(0431-880-2996)
- Janick, J., Department of Horticulture, Purdue University, (1) USA
West Lafayette, Indiana 47907. (317-494-1329).
- Johnson, D. E., 3310 Jefferson Avenue, Yakima, Washington (2) USA
98902.
- Jones, A. L., Department of Botany & Plant Pathology, (2) USA
Michigan State University, East Lansing, Michigan 48823.
(517-355-4573)

- Jorgensen, H. A., National Plant Pathology Institute, (2) DK
Lottenborgvej 2, 2800 Lyngby, Denmark. (01-8725-10)
- Joseph, E., Service Phytosanitaire, Div. de l'Agriculture, (3) SWT
Martenhofstr. 5, 3003 Bern, Switzerland.
- Kado, C. I., Department of Plant Pathology, University (2) USA
of California, Davis, California 95616. (916-752-0325)
- Kappel, F. Department of Horticulture, University of Guelph, (1) CND
Guelph, Ontario N1G 2W1, Canada. (519-824-4120)
- Kato, T., Research Department - Pesticides Div., Institute (3) JAP
for Biological Science, Sumitomo Chemical Co., Ltd.,
4-2-1, Takatsukasa, Takarazuka, Hyogo, 665, Japan.
- Kleinhenkel, H., Inst. fur Phytopathologie, Akad. Landwirtsch. (3) DDR
Wissensch., Theodor-Roemer-Weg 4, 4320 Aschersleben,
East Germany. (5141)
- Klement, Z., Dept. of Pathophysiology & Disease Resistance, (3) HUN
Plant Protection Institute, Herman Otto u. 15, P.O. 102,
1525 Budapest, Hungary. (358-137)
- Klos, E. J., Department of Botany & Plant Pathology, (1) USA
Michigan State Univ., East Lansing, Michigan 48823.
(517-355-4680)
- Knosel, D., Inst. fur Angewandte Botanik, Univ. of Hamburg, (1) BRD
Marseiller Str. 7, 2000 Hamburg 36, West Germany.
(040-4123-2353)
- Koenigshof, R., Pear Research Association, Box 4050, (2) USA
Kerlikowske Rd., Coloma, Michigan 49038.
(616-849-2375)
- Kooistra, T., Plant Protection Service, Geertjesweg 15, (1) NL
P. O. Box 9102, 6706 EA Wageningen, The Netherlands.
(08370-19001)
- Kraus, P., Bayerwerk, Pflanzenschutz Anwendungstechnik, (3) BRD
Biologische Forschung, 5090 Leverkusen, West Germany.
(02172-306081)
- Kristensen, H. R., State Plant Pathology Institute, (2) DK
Lottenborgvej 2, 2800 Lyngby, Denmark
- Kroeker, G., Swedish Univ. of Agric. Sciences, Box 7036, (3) SWD
75007, Uppsala 7, Sweden. (013-102000)
- Kuc, J., Dept. of Plant Pathology, S-305 Agric. Sci. Center (2) USA
North, Univ. of Kentucky, Lexington, Kentucky 40506.
(606-258-4973)

<u>Kudela</u> , V., Institute of Plant Protection, Research Inst. of Plant Production, Drnovska 507, 16106 Prague 6 (Ruzyne), Czechoslovakia.	(3)	CZE
Kuhne, H., Pflanzenschutzamt der Ldw. Kammer Weser-Ems, Mars-la-Tour-Str. 9/11, 2900 Oldenburg, West Germany.	(2)	BRD
Kyle, Nancy E., 2222 N. Richland, Phoenix, Arizona 85006. (602-252-3060)	(1)	USA
Lacy, G. H., Department of Plant Pathology, Conn. Agric. Expt. Station, New Haven, Connecticut 06504. (203-789-7222)	(2)	USA
Laere, O. van, Research Station for Nematology and Entomology, Burg. van Gansberghelaan 96, 9220 Merelbeke, Belgium. (091-52.20.85)	(1)	BLG
Lamb, R. C., Department of Pomology & Viticulture, N. Y. State Agr. Expt. Station, Geneva, New York 14456. (315-787-2235)	(1)	USA
Landis, W. R., Agric. Chem. Development, MSD Agvet Division, P. O. Box 2000, Rahway, New Jersey 07065. (201-574-6605)	(2)	USA
Lane, D., Agriculture Canada, Research Branch, Res. Station, Summerland, British Columbia V0H 1Z0, Canada. (604-494-0401)	(2)	CND
Langeslag, J. J. J., Plant Protection Service, Geertjesweg 15, P. O. Box 9102, 6700 HC Wageningen, The Netherlands.	(2)	NL
Large, M., Service de la Protection des Vegetaux, Chemin d'Artigues B.P.47, 33150 Cenon La Morlette, France. (56-86.22.75)	(1)	FR
Larcoche, M., Centre d'Etudes des Phytobacterioses, Lab. de Phytopathologie, 3 Place Croix du Sud. Sci. 15 D, 1348 Louvain-La-Neuve, Belgium (010-41.81.81 ext. 3746)	(1)	BLG
Lecomte, P., Laboratoire Feu Bacterien, Lycee Agricole d'Oereluy, St. Paul, 40990 Les Dax, France. (58-74.11.93, ext. 22)	(1)	FR
Lehmann-Danzinger, H., Inst. fur Pflanzenpath. und Pflanzensch., Grisebachstr. 6, 3400 Gottingen, West Germ.	(2)	BRD
Lelliott, R. A., Agricultural Science Service, Harpenden Laboratory, Hatching Green, Harpenden, Herts AL5 2BD, England. (Harpenden 5241)	(2)	UK
Letal, J., Regional Crops Laboratory, Box 10, Olds, Alberta T0M 1P0, Canada. (403-556-8421)	(2)	CND

- | | | |
|--|-----|-----|
| Lombard, P. B., Department of Horticulture, Oregon State University, Corvallis, Oregon 97331. (503-754-3695) | (2) | USA |
| Lopez Gonzalez, M., Dept. Proteccion Vegetal, I.N.I.A., CRIDA 07, Moncada-Valencia, Spain. (739-1000) | (3) | SPN |
| Luchene, K., van, Ministerie van Landbouw, Dienst Plantenbescherming, Gebrs. Vandeveldestraat 68, 9000 Gent, Belgium. | (1) | BLG |
| Luepschen, N. S., Tree Disease Consulting Service, Rim Rock Campground, 73179 State Highway 64, Meeker, Color. 81641. (303-878-4486) | (2) | USA |
| Lux-Wellenhof, E., Ciba-Geigy GmbH, Postfach 11.03.53, 6000 Frankfurt 11, West Germany (0611-7155.257) | (2) | BRD |
| <u>Maas Geesteranus</u> , H. P., Research Institute for Plant Protection, Binnenhaven 12, P. O. Box 9060, 6700 GW Wageningen, The Netherlands. (08370-19151) | (1) | NL |
| Mansergas, A. J. F., Ministerio de Agricultura, Departamento de Fruticultura, Apartado 202, Zaragoza, Spain. (976-29 72 07) | (3) | SPN |
| Mappes, D., BASF, Fruit Experimental Station, P.O. Box 220, 6703 Limburgerhof, West Germany | (2) | BRD |
| Maroquin, C., Station de Phytopathologie de l'Etat, 13 Ave. Marechal Juin, 5800 Gembloux, Belgium. | (2) | BLG |
| <u>Martins</u> , J. M. S., Dept. Fitopatologia, Estacao Agronomica Nacional, 2780 Oeiras, Portugal. | (3) | POR |
| Massfeller, D., Pflanzenschutzamt der Ldw. Kammer Rheinland, Ludwig Erhard Str. 99, 5300 Bonn-2, West Germany. (02221-376931) | (1) | BRD |
| Mathys, G., European and Mediter. Plant Protect. Organ., 1 rue Le Notre, 75016 Paris, France. (870-77-94) | (2) | FR |
| <u>Matthee</u> , F. N., Department of Plant Pathology, Univ. of Western Cape, Bellville, South Africa. | (3) | SA |
| Mazzucchi, U., Laboratorio Fitobatteriologia, Istituto Patol. Vegetale, via Filippo Re 8, 40126 Bologna, Italy. (227401) | (3) | ITA |
| <u>McPhee</u> , R., Agriculture Canada, Research Station, Summerland, British Columbia V0H 1Z0, Canada. (604-494-7711) | (2) | CND |
| McSwan, I. C., Extension Plant Pathology, 1089 Cordley Hall, Oregon State University, Corvallis, Oregon 97331. (503-754-3472) | (4) | USA |

- Meijneke, C. A. R., Plant Protection Service, Geertjesweg 15, (2) NL
P. O. Box 9102, 6700 HC Wageningen, The Netherlands.
(08370-19001)
- Mendoza H., A., Centro de Fitopatologia, Colegio de (1) MEX
Postgraduados, 56230 Chapingo, Est. de Mexico,
Mexico (5-85-45-55 ext. 5406)
- Meyer, F. C., Catedra de Fitopatologia, Facultad de Ciencias (3) ARG
Agrarias, Universidad Nacional del Comahue, 8303 Cinco
Altos, Argentina.
- Meyer, J., Amt fur Land-und Wasserwirtschaft, Abteilung (1) BRD
Pflanzenschutz, Herzog-Adolf Strasse 1b, 225 Husum,
West Germany. (04841-2746)
- Michel, H. G., Landesanstalt fur Pflanzenschutz, (3) BRD
Reinsburgstr. 107, 7000 Stuttgart - 1, West Germany.
(0711/6676-2575 or 73)
- Mickail, K. Y., Plant Pathology Research Inst., (1) EGY
Agric. Research Centre, Cairo (Giza), Egypt (723000)
- Miller, H. J., Plant Protection Service, Geertjesweg 15, (1) NL
P. O. Box 9102, 6700 HC Wageningen, The Netherlands.
- Miller, R. W., Dept. of Plant Path. and Physiol., Clemson (2) USA
Univ., Clemson, South Carolina 29631. (803-656-2335)
- Morehead, G. W., Farm Advisors Office, 4145 Branch Center (1) USA
Road, Sacramento, California 95827. (916-366-2013)
- Morton, H. V., Ciba-Geigy Corp., P.O. Box 18300, (2) USA
Greensboro, North Carolina 27419. (919-292-7100)
- Mosegaard, J., Dansk Plantekoleejer Forening, Elmedals (2) DK
Allee 33, 5250 Fruens Boge, Denmark.
- Muir, J., Alberta Agriculture, Research Station, Fairview, (2) CND
Alberta, T0H 1L0, Canada.
- Muller, H. J., Institut fur Phytopathologie, Theodor-Roemer (3) DDR
Weg 1-4, 432 Aschersleben, East Germany.
- Muller, K., Institut fur Pflanzenschutz der Ldw. Kammer (2) BRD
Westfalen-Lippe, Kanalstr. 240, 4400 Munster,
West Germany.
- Norelli, J. L., Department of Plant Pathology, N.Y. State (1) USA
Agric. Expt. Station, Geneva, New York 14456.
(315-787-2317)
- Noval Alonso, Cristina, Dept. de Proteccion Vegetal, Inst. (3) SPN
Nacional de Investigaciones Agrarias, Apartado 8111,
Madrid, Spain. (207-80-40, ext. 279)

- | | | |
|---|-----|-----|
| Oberhofer, H., Sudtiroler Beratungsring fur Obst und Weinbau, A. Hoferstrasse 9, 39011 Lana, Sudtiro, Italy. | (3) | ITA |
| <u>Okuse, I.</u> , Faculty of Agriculture, Laboratory of Hortic., Hirosaki University, Hirosaki, Aomori, Japan. | (3) | JAP |
| Olsson, Karen M., Swedish Univ. of Agric. Sciences, Dept. of Plant and Forest Protection, P. O. Box 7044, 750 07 Uppsala, Sweden. (018-10-20-00) | (3) | SWD |
| Opgenorth, D. C., Department of Plant Pathology, Univ. of California, Riverside, Calif. 92507. (714-787-4119) | (2) | USA |
| Otterbacher, A., University of Illinois, 105 Horticulture Field Laboratory, Urbana, Illinois 61801. (217-333-1520) | (2) | USA |
| Ottermann, A., Schering AG, Claudiusweg 13, 2077 Trittau, West Germany. | (2) | BRD |
| Pacit, J., Institute of Experimental Phytopathology and Entomology, Slovak Academy of Sciences, 900-28 Ivanka pri Dunaji, Czechoslovakia. | (3) | CZE |
| Paetzholdt, M., Pflanzenschutzamt, Hauptstrasse 108, 2084 Rellingen, West Germany. | (2) | BRD |
| Palazon, I., Departamento de Proteccion Vegetal, Centro de Investigaciones y Desarrollo Agrario del Ebro, Apartado 727, Zaragoza, Spain. (297207) | (3) | SPN |
| Panagopoulos, C. G., Benaki Phytopathological Institute, Kiffissia, Athens, Greece. (01-8013619) | (3) | GRC |
| Parnia, P., Scientific Director, Trustul Pomiculturii, Pitesti-Maracineni, Romania. (976-34.292) | (3) | ROM |
| <u>Paulin, J. P.</u> , Station de Phytobacteriologie, I.N.R.A., Route de St. Clement, Beaucouze, 49000 Angers, France. (41-48.51.23) | (1) | FR |
| Pecknold, P. C., Department of Botany & Plant Pathology, Purdue University, West Lafayette, Indiana 47907. (317-749-6530) | (2) | USA |
| Persiel, F., Bundesforschungsanstalt fur Gartenbauliche Pflanzenzuchtung, Bornkampsweg, 2070 Ahrensburg, West Germany. (04102-51122) | (1) | BRD |
| Petiot, J., Service de la Protection des Vegetaux, Cité Administrative, 59048 Lille Cedex, France. (20-52.12.21) | (1) | FR |
| Pilar, R., Departamento de Proteccion Vegetal, Centro de Invest. y Desarrollo Agrar. del Ebro, Apartado 727, Zaragoza, Spain (297207) | (3) | SPN |

- Porreye, W., Research Station of Gorsem, Brede Akker 3,
3800 Sint-Truiden, Belgium. (011-672019) (1) BLG
- Preczewski, J. L., Product Development Dept., Stark
Brothers Nurseries Co., Louisiana, Missouri 63353.
(314-754-5009) (2) USA
- Preiser, F., Research Laboratories, Merck and Company, Inc.,
Bldg. R123-12, Rahway, New Jersey 07065. (201-574-6687) (2) USA
- Prillwitz, H. G., Landespflanzenenschutzamt, Essenheimerstr.
144, 6500 Mainz - Bretzenheim, West Germany. (3) BRD
- Psallidas, P. G., Benaki Phytopathological Institute,
Kiffissia, Athens, Greece. (01-8013619) (3) GRC
- Quamme, H., Agriculture Canada, Research Station, Summerland,
Brit. Columbia V0H 1Z0, Canada. (604-494-0401) (2) CND
- Rackham, R. L., Benton County Extension Service,
2720 N.W. Polk Street, Corvallis, Oregon 97330.
(503-776-7371) (1) USA
- Reimann-Philipp, R., Bundesforschungsanstalt für
Gartenbauliche Pflanzenzucht, Bornkampsweg,
2070 Ahrensburg, West Germany. (04102-51122) (1) BRD
- Richter, J., Landesamt für Pflanzenschutz, Reinsburgerstr.
107, 7000 Stuttgart-1, West Germany. (2) BRD
- Ride, M., Station de Phytobacteriologie, I.N.R.A.,
Route de St. Clement, Beaucouze, 49000 Angers, France.
(41-88.22.00) (3) FR
- Ries, S. M., Department of Plant Path., Univ. of Illinois,
N-427 Turner Hall, 1102 S. Goodwin, Urbana, Ill. 61801.
(217-333-1523) (1) USA
- Ristevski, B., Fruit Research Station, Faculty of Agric,
91000 Skopje, Yugoslavia (091-230-557) (3) YUG
- Ritchie, D. F., Department of Plant Pathology, N. C.
State University, Raleigh, North Carolina 27695.
(919-737-2721) (2) USA
- Roed, H., The Norwegian Plant Protection Institute,
1432 As-NLH, Norway. (3) NOR
- Rom, R. C., Dept. of Hortic., Room 316, Plant Science Bldg.
Univ. of Arkansas, Fayetteville, Ark. 72701.
(501-575-2604) (2) USA
- Roosje, G. S., Research Institute for Plant Protection,
Binnenhaven 12, P. O. Box 9060, 6700 GW Wageningen,
The Netherlands. (08370-19151, ext. 228) (2) NL

- | | | |
|--|-----|-----|
| Rose, E., Hoechst AG, Landwirtsch. (Entwicklungsabteilung, Prufstelle Nord), Karl Wiechert Allee 3, 3000 Hannover 61, West Germany. (0511-5700.245) | (2) | BRD |
| Rosenberger, D. A., New York Agric. Exp. Station, Box 727 Highland, New York 12528. (914-255-8678) | (2) | USA |
| <u>Ross</u> , R. G., Agriculture Canada, Research Station, Kentville, Nova Scotia B4N 1J5, Canada. (902-678-2171) | (2) | CND |
| Rousselle, G. L., Agriculture Canada, Research Station, P. O. Box 457, St. Jean, Quebec J3B 6Z8, Canada. (514-346-4494) | (2) | CND |
| Rowson, G. R., Fruit Production Div., Showerings Vine Products and Whiteways Ltd., West Newton, Nr. Bridgewater, Somerset TA7 0BZ, England (412336) | (2) | UK |
| Rudolph, K., Institut fur Pflanzenpath. und Pflanzensch., Grisebachstr. 6, 3400 Gottingen, West Germany. (393721) | (2) | BRD |
| Russ, K., Bundesanstalt fur Pflanzenschutz, Trunnerstrasse 5, 1021 Vienna, Austria. (0222-24.15.11) | (3) | OST |
| Ryugo, K., Department of Pomology, University of California, Davis, California 95616. (916-752-0929) | (2) | USA |
| Samson, Regine, Station de Phytobacteriologie, I.N.R.A., Route de St. Clement, Beaucouze, 49000 Angers, France. (41-87.69.97) | (2) | FR |
| Sanchezmonge, E., Departamento Genetica, Estac. Agronomos, Ciudad Universitaria, Madrid 3, Spain. | (3) | SPN |
| Sands, D. C., Dept. of Plant Path., Montana State Univ., Bozeman, Montana 59717. (406-994-4832) | (2) | USA |
| Sasser, M., Dept. of Plant Science, Univ. of Delaware, Newark, Delaware 19711. (302-738-2534) | (1) | USA |
| Schaper, U., Biologische Bundesanstalt, Institut fur Pflanzenbau im Obstbau, Postfach 73, 6901 Dossenheim ub. Heidelberg, West Germany. | (2) | BRD |
| Scheer, H. A. T. van der, Research Station for Fruit Growing, Brugstraat 51, 4475 AN Wilhelminadorp, The Netherlands. (01100-16390) | (2) | NL |
| Schilli, E., Inst. fur Phytomedizin, Univ. Hohenheim, Otto-Sanderstrasse 5, 7000 Stuttgart-70, West Germany | (2) | BRD |
| Schmidle, A., Biologische Bundesanstalt, Institut fur Pflanzenschutz im Obstbau, Schwabenheimerstrasse, Postfach 73, 6901 Dossenheim/Heidelberg, West Germany. (06221-85238) | (3) | BRD |

- | | | |
|---|-----|-----|
| Schmidt, H., Pflanzenschutzamt des Landes Schleswig-Holstein, Westring 383, 2300 Kiel, West Germany. | (1) | BRD |
| Schroth, M. N., Department of Plant Pathology, Univ of California, Berkeley, Calif. 94720. (415-642-4147) | (1) | USA |
| Schulz, F. A., Inst. fur Phytopath., Christ.-Albrechts Univ., Olshausenstrasse 40-60, 2300 Kiel, West Germany. (0431-880-2996) | (1) | BRD |
| Schwabe, W. F. S., Fruit and Fruit Tech. Res. Inst., Private Bag 5013, 7600 Stellenbosch, South Africa (02231-2001) | (3) | SA |
| Seem, R. C., Department of Plant Pathology, N. Y. State Agric. Expt. Station, P. O. Box 462, Geneva, NY 14456. (315-787-2366) | (2) | USA |
| <u>Seemuller</u> , E., Biologische Bundesanstalt, Institut fur Pflanzenschutz im Obstbau, Schwabenheimerstrasse, Postfach 73, 6901 Dossenheim/Heidelberg, West Germany. (06221-85238) | (2) | BRD |
| Severin, V., Laboratory of Phytobacteriology, Research Inst. for Plant Protection, Blvd. Ion Ionescu de la Brad 8, Bucharest-Baneasa, Romania. (33.58.58-50) | (3) | ROM |
| Sharma, V. P., Dept. of Plant Pathology, Haryana Agric. University, Hissar 125004, India | (3) | IND |
| Simonsen, J., State Experimental Station, Laasbyvej 18, 8660 Skanderborg, Denmark. (06-520877) | (2) | DK |
| <u>Slack</u> , D., Dept. of Plant Pathology, Univ. of Arkansas, Fayetteville, Arkansas 72701. (501-575-2446) | (1) | USA |
| Smith, A. R. W., School of Biolog. Sciences and Environmental Health, Thames Polytechnic, Wellington Street, London SE18 6PF, England | (1) | UK |
| <u>Sobiczewski</u> , P., Research Institute of Pomology, ul. Pomologiczna 18, 96-100 Skierniewice, Poland. (Skierniewice 34-21) | (3) | POL |
| Soledad, S. V., Tagum, North Davao, Philippines 9401. | (3) | PHI |
| Spotts, R. A., Mid-Columbia Expt. Station, 3005 Expt. Station Drive, Hood River, Oregon 97031. (503-386-2030) | (2) | USA |
| <u>Stankovic</u> , D., Horticulture Dept., Faculty of Agriculture, Univ. of Belgrade, ul. Nemanjina 6, 11080 Zemun (Belgrade), Yugoslavia. | (3) | YUG |
| Stark, C., Pflanzenschutzamt, Slevogtstr. 48, 2800 Bremen 1, West Germany. | (2) | BRD |

- Starr, M. P., Department of Bacteriology, University of California, Davis, Calif. 95616. (916-756-7000) (1) USA
- Stead, D., Min. Agric. Fish. and Food, Harpenden Laboratory, Hatching Green, Harpenden, Herts AL5 2BD England (5241) (1) UK
- Steiner, P., Department of Botany, University of Maryland, College Park, Maryland 20742. (301-454-3816) (2) USA
- Stushnoff, C., Department of Horticultural Science, Univ. of Minnesota, St. Paul, Minnesota 55101. (612-373-1030) (2) USA
- Sugar, D., Southern Oregon Expt. Station, 569 Hanley Rd., Medford, Oregon 97502. (503-772-5165) (2) USA
- Suta, Victoria, Research Institute for Fruit Growing, 0300 Pitesti-Maracineni, Romania (976-34292) (3) ROM
- Sutton, T. B., Department of Plant Pathology, N. C. State Univ., Raleigh, North Carolina 27650. (919-737-2752) (1) USA
- Swanson, B. T., Dept. of Horticulture, 356 Alderman Hall, University of Minnesota, St. Paul, Minnesota 55108. (612-373-1011) (1) USA
- Szkolnik, M., Department of Plant Pathology, N. Y. State Agr. Exp. Station, Geneva, New York 14456. (315-787-2375) (1) USA
- Teissier, R., Service de la Protection des Vegetaux, 231 rue de la Convention, 75015 Paris, France. (532-21-29) (3) FR
- Teylingen, M. van, Plant Protection Service, Geertjesweg 15, P. O. Box 9102, 6700 HC Wageningen, The Netherlands. (2) NL
- Thibault, B., Station d'Arboriculture Fruitiere, I.N.R.A., Route de St. Clement, Beaucouze, 49000 Angers, France. (41-48.51.23) (1) FR
- Thompson, J. M., USDA SE Fruit & Tree Nut Research Station, P. O. Box 87, Byron, Georgia 31008. (912-956-5656) (1) USA
- Thomson, S. V., Department of Biology, Utah State Univ., Logan, Utah 84322. (801-750-3406) (1) USA
- Travis, J. A., Department of Plant Pathology, Penn State University, Buckhart Lab., University Park, PA 16802. (2) USA
- Tsiantos, J., Plant Protection Inst., Volos, Greece (3) GRC
- Valyi, S., Department of Plant Protect. and Agrochemistry, Ministry of Agriculture and Food Admin., Kossuth Lajos ter 11, Budapest, Hungary. (3) HUN

Van Buskirk, P. D., Southern Oregon Expt. Station, 569 Hanley Rd., Medford, Oregon 97502 (503-772-5165)	(1)	USA
Vantomme, R., Laboratory for Microbiology, Ledeganckstraat 35, 9000 Gent, Belgium.	(1)	BLG
Veldeman, R., Ministry of Agriculture, Research Station for Phytopathology, Burg. van Gansberghelaan 96, 9220 Merelbeke, Belgium. (091-522083)	(2)	BLG
Vereecke, M., Belgian Plant Protection Service, Rue de Stassart 36, 1050 Brussels, Belgium	(2)	BLG
Vogelsanger, D., Pflanzenschutzamt, Hermannswerder 20A, 15 Potsdam, East Germany.	(3)	DDR
Vondracek, J., Fruit Research Station, Techobuzize, 411 42 Ploskovice (okr. Litomerice), Czechoslovakia. (Ploskovice 9387)	(3)	CZE
<u>Voronkova</u> , L., Dept. of Bacteriology, Central Laboratory for Plant Quarantine, 1/11 Orlikov per., 107139 Moscow, B-139, Russia.	(3)	RUS
Vukovits, G., Bundesanstalt fur Pflanzenschutz, Vienna, Austria.	(3)	OST
<u>Wade</u> , E. K., Department of Plant Pathology, University of Wisconsin, Madison, Wisconsin 53706. (608-262-1426)	(2)	USA
Waldner, W., Sudtiroler Beratungsring fur Obst und Weinbau, Andreas Hoferstrasse, 39011 Lana, Italy	(3)	ITA
<u>Walsh</u> , P. F., Dept. of Agriculture, Agriculture House, Kildare St., Dublin 2, Ireland. (789011, ext. 3289)	(3)	IRL
Way, R. D., Department of Pomology & Viticulture, N. Y. State Agric. Expt. Station, Geneva, New York 14456. (315-787-2235)	(1)	USA
Westwood, M. N., Department of Horticulture, Oregon State University, Corvallis, Oregon 97331. (503-754-3695)	(2)	USA
Wiggel, D., Ministry of Agriculture, Olantigh Road, Wyl, Nr. Ashford, Kent, England.	(2)	UK
Willett, M., Extension Service, Oregon State University, 1301 Maple Grove Drive, Medford, Oregon 97501. (503-776-7371)	(2)	USA
Wimalajeewa, S., Plant Research Institute, Burnley Gardens Swan Street, Burnley, Victoria 3121, Australia. (8101511)	(3)	AUS

- | | | |
|--|-----|-----|
| Wodzinski, R. S., Biology Department, Ithaca College,
Ithaca, New York 14850. (607-274-3979) | (1) | USA |
| Yoder, K. S., Fruit Research Laboratory, Va. Polytech.
Inst., 2500 Valley Ave., Winchester, Virginia 22601.
(703-667-8330) | (1) | USA |
| Yorston, Y. M., Brit. Columb. Ministry of Agric., Research
Station, Summerland, British Columbia V0H 1Z0, Canada.
(604-494-0401) | (2) | CND |
| Young, J. M., Plant Diseases Division, MARC, Private Bag,
Auckland, New Zealand. (893660) | (2) | NZ |
| Zehr, E. I., Department of Plant Pathology & Physiology,
Clemson University, Clemson, South Carolina 29631.
(803-656-3450) | (2) | USA |
| <u>Zeller, W.</u> , Biologische Bundesanstalt fur Land und
Forstwirtschaft, Institut fur Pflanzenschutz in
Ackerbau und Grunland, Schlosskoppelweg 8, 2305
Heikendorf-Kitzeberg (Kiel), West Germany.
(0431-23495) | (1) | BRD |
| <u>Zoller, B. G.</u> , The Pear Doctor, Inc., P. O. Box 952,
Yuba City, California 95991. (916-674-1255) | (2) | USA |
| Zwet, T. van der, U. S. Department of Agriculture,
Appalachian Fruit Research Station, Rt. 2, Box 45,
Kearneysville, West Virginia 25430.
(304-725-3451, ext. 29) | (1) | USA |

Working Group Membership by Country^{1/}

<u>Argentina</u>	Bergna, D. A. Dobra, A.	*Meyer, F. C.
<u>Australia</u>	*Cartwright, D. N. Wimalajeewa, S.	
<u>Austria</u>	Russ, K. Vukovits, G.	
<u>Belgium</u>	Deckers, T. De Ley, J. Geenen, J. Laere, O. van Laroche, M. Luchene, K. van	Maroquin, C. *Porrey, W. Vantomme, R. Veldeman, R. Vereecke, M.
<u>Brazil</u>	Bredemeier, D. Feliciano, A. J.	
<u>Canada</u>	Agr. Can. Library Biggs, A. R. *Bonn, W. G. Cline, R. A. Coulombe, L. J. Crowe, A. D. Davidson, J. G. N. *Evans, I. R. Gibbins, L. N. Horricks, J.	Howard, R. J. Hunter, C. L. Kappel, F. Lane, D. Lethal, J. *McPhee, R. Muir, J. Quamme, H. *Ross, R. G. Rousselle, G. L. Yorston, Y. M.
<u>China (P.R.)</u>	*Cao, R.	
<u>Czechoslovakia</u>	*Kudela, V. Paclt, J.	Vondracek, J.
<u>Denmark</u>	Andersen, H. Christensen, F. G. *Dinesen, G. Jorgensen, H. A.	Kristensen, H. R. Mosegaard, J. Simonsen, J.
<u>East Germany</u>	*Kleinhempel, H. Muller, H. J.	Vogelsanger, D.
<u>Egypt</u>	*Abo-El-Dahab, M. K. Mickail, K. Y.	

^{1/} Names with asterisk (*) are contact persons.

<u>England</u>	Alston, F. H. Bennett, R. A. Billing, E. Byrde, R. J. W. Cooper, R. M. Fox, R. T. V. *Garrett, C. M. E.	Gwynne, G. Hignett, R. C. Lelliott, R. A. Rowson, G. R. Smith, A. R. W. Stead, D. Wiggel, D.
<u>France</u>	Balavoine, P. Callu, D. Large, M. Lecomte, P. Mathys, G. *Paulin, J. P.	Petiot, J. Ride, M. Samson, R. Teissier, R. Thibault, B.
<u>Greece</u>	Panagopoulos, C. G. *Psallidas, P. G.	Tsiantos, J.
<u>Hungary</u>	*Klement, Z. Valyi, S.	
<u>India</u>	Gupta, V. K.	Sharma, V. P.
<u>Ireland</u>	*Walsh, P.	
<u>Italy</u>	*Bazzi, C. Calzolari, A. Ercolani, G. L. Fideghelli, C.	Garibaldi, A. Mazzucchi, U. Oberhofer, H. Waldner, W.
<u>Japan</u>	Goto, M. Kato, T.	*Okuse, I.
<u>Morocco</u>	Benjama, A.	*Chouibani, M.
<u>Mexico</u>	*Fucikovsky, L.	Mendoza, H., A.
<u>Netherlands</u>	Bouma, S. CHRONICA HORTIC. Heybroek, H. M. Kooistra, T. Langeslag, J. J. J. *Maas Geesteranus, H. P.	Mijneke, C. A. R. Miller, H. J. PUDOC Roosje, G. S. Scheer, H. A. T. van der Teylingen, M. van
<u>New Zealand</u>	Dye, D. W. *Hale, C. N.	Young, J. M.
<u>Norway</u>	Dale, T. *Roed, H.	
<u>Philippines</u>	Soledad, S. V.	

<u>Poland</u>	Burkowicz, A. *Sobiczewski, P.	
<u>Portugal</u>	Conceicao, J.	*Martins, J. M. S.
<u>Romania</u>	Parnia, P. Severin, V.	*Suta, V.
<u>Russia</u>	*Voronkova, L.	
<u>South Africa</u>	Button, J. Erskine, J. M.	*Matthee, F. N. Schwabe, W. F. S.
<u>Spain</u>	Lopez, Gonzalez, M. Mansergas, A. J. F. *Noval Alonso, C.	Palazon, I. Pilar, R. Sanchezmonge, E.
<u>Sweden</u>	*Graberg, M. Kroeker, G.	Olsson, K. M.
<u>Switzerland</u>	Bolay, A. Cazelles, O. Egli, T.	*Grimm, R. Joseph, E.
<u>Turkey</u>	Baykal, N.	
<u>West Germany</u>	Baum, L. H. Brulez, W. Cornils, H. Duben, J. Franz, W. Graf, H. Hoppe, H. Isenbeck, M. Knosel, D. Kraus, P. Kuhne, H. Lehmann-Danzinger, H. Lux-Wellenhof, E. Mappes, D. Massfeller, D. Meyer, J. Michel, H. G.	Muller, K. Ottermann, A. Paetzholdt, M. Persiel, F. Prillwitz, H. G. Reimann-Philipp, R. Richter, J. Rose, E. Rudolph, K. Schaper, U. Schilli, E. Schmidle, A. Schmidt, H. Schulz, F. A. *Seemuller, E. Stark, C. *Zeller, W.
<u>Yugoslavia</u>	Arsenijevic, M. Ristevski, B.	*Stankovic, D.

USA

- Abdel-Rahman, M.
 Aldwinckle, H. S.
 Ark, P. A.
 *Barrat, J. G.
 Bates, J. J.
 *Beer, S. V.
 Bell, R. L.
 Berry, D. W.
 Beutel, J. A.
 Biehn, W.
 Burr, T. J.
 Bushong, J. W.
 Cameron, H. R.
 Carlson, R. F.
 Carroll, V. J.
 Chandler, D.
 Civerolo, E. L.
 Clayton, C. N.
 *Covey, R. P.
 Crassweller, R.
 Cummins, J. N.
 Davidson, S.
 *Douglas, S. M.
 *Drake, C. R.
 Egolf, D. R.
 *Ellis, M. A.
 French, J. R.
 Gantotti, B. V.
 Gates, D.
 *Goodman, R. N.
 Harnish, W.
 Heimann, M. F.
 *Hickey, K. D.
 Hildebrand, E. M.
 *Janick, J.
 Johnson, D. E.
 Jones, A. L.
 Kado, C. I.
 *Klos, E. J.
 Koenigshof, R.
 Kuc, J.
 Kyle, N. E.
 Lacy, G. H.
 Lamb, R. C.
 Landis, W. R.
 Lombard, P. B.
 Luepschen, N. S.
 McSwan, I. C.
 *Miller, R. W.
 Morehead, G. W.
 Morton, H. V.
 Norelli, J. L.
 Opgenorth, D. C.
 Otterbacher, A.
 Pecknold, P. C.
 Preczewski, J. L.
 *Preiser, F.
 Rackham, R. L.
 *Ries, S. M.
 *Ritchie, D. F.
 Rom, R. C.
 Rosenberger, D. A.
 Ryugo, K.
 Sands, D. C.
 Sasser, M.
 Schroth, M. N.
 Seem, R. C.
 *Slack, D.
 Spotts, B. P.
 Starr, M. P.
 *Steiner, P.
 Stushnoff, C.
 *Sugar, D.
 Sutton, T. B.
 Swanson, B. T.
 Szkolnik, M.
 *Thompson, J. M.
 *Thomson, S. V.
 Travis, J. A.
 Van Buskirk, P. D.
 *Wade, E. K.
 Way, R. D.
 Westwood, M. N.
 Willett, M.
 Wodzinski, R. S.
 Yoder, K. S.
 Zehr, E. I.
 *Zoller, B. G.
 Zwet, T. van der

SUMMARY

Contact Persons for Fire Blight Newsletter

<u>United States</u>		<u>Other Countries</u>	
Arkansas	Slack, D.	Argentina	Meyer, F. C.
California	Zoller, B. G.	Australia	Cartwright, D. N.
Connecticut	Douglas, S. M.	Belgium	Porreye, W.
Georgia	Thompson, J. M.	China (P.R.)	Cao, R.
Illinois	Ries, S. M.	Czechoslovakia	Kudela, V.
Indiana	Janick, J.	Denmark	Dinesen, A.
Maryland	Steiner, P.	Egypt	Abo-El-Dahab, M.K.
Michigan	Klos, E. J.	England	Garrett, C. M. E.
Missouri	Goodman, R. N.	France	Paulin, J. P.
New Jersey	Preiser, F.	Germany (East)	Kleinhempel, H.
New York	Beer, S. V.	Germany (West)	Seemuller, E.
North Carolina	Ritchie, D. F.		Zeller, W.
Ohio	Ellis, M. A.	Greece	Psallidas, P. G.
Oregon	Sugar, D.	Hungary	Klement, Z.
Pennsylvania	Hickey, K. D.	Ireland	Walsh, P.
South Carolina	Miller, R. W.	Italy	Bazzi, C.
Utah	Thomson, S. V.	Japan	Okuse, I.
Virginia	Drake, C. R.	Mexico	Fucikovsky, L.
Washington	Covey, R. P.	Morocco	Chouibani, M.
West Virginia	Barrat, J. G.	Netherlands	Maas Geesteranus, H. P.
Wisconsin	Wade, E. K.	New Zealand	Hale, C. N.
		Norway	Roed, H.
		Poland	Sobiczewski, P.
		Portugal	Martins, J. M. S.
		Romania	Suta, V.
		Russia	Voronkova, L.
		South Africa	Matthee, F. N.
		Spain	Noval Alonso, C.
		Sweden	Graberg, M.
		Switzerland	Grimm, R.
		Yugoslavia	Stankovic, D.
<u>Canada</u>			
Alberta	Evans, I. R.		
British Columbia	McPhee, R.		
Nova Scotia	Ross, R. G.		
Ontario	Bonn, W. G.		

SUMMARY

Persons Interested in Fire Blight

Country	Interest Category				Total	Number of Contact Persons
	1	2	3	4		
* USA - United States	37	48		4	89	21
* CND - Canada	3	18			21	4
* BRD - West Germany	12	19	3		34	2
* UK - England	9	5			14	1
* NL - Netherlands	5	7			12	1
* FR - France	5	3	3		11	1
* BLG - Belgium	7	4			11	1
* DK - Denmark	1	6			7	1
* DDR - East Germany			3		3	1
* NZ - New Zealand	1	2			3	1
* POL - Poland	1		1		2	1
* EGY - Egypt	2				2	1
* MEX - Mexico		1			1	1
ITA - Italy			8		8	1
SPN - Spain			6		6	1
SWT - Switzerland			5		5	1
SA - South Africa			4		4	1
ARG - Argentina			3		3	1
CZE - Czechoslovakia			3		3	1
JAP - Japan			3		3	1
ROM - Romania			3		3	1
SWD - Sweden			3		3	1
YUG - Yugoslavia			3		3	1
GRC - Greece			3		3	1
AUS - Australia			2		2	1
HUN - Hungary			2		2	1
POR - Portugal			2		2	1
NOR - Norway			2		2	1
MOR - Morocco			2		2	1
IRL - Ireland			1		1	1
CHI - China			1		1	1
RUS - Russia			1		1	1
OST - Austria			2		2	
BRA - Brazil			2		2	
IND - India			2		2	
PHI - Philippines			1		1	
TUR - Turkey			1		1	
TOTAL	83	113	75	4	275	56

*Countries with fire blight.

Fire Blight Mailing List Questionnaire

The list of names in this Newsletter is an annual attempt to establish a complete and updated mailing list of all persons interested in fire blight. Please make corrections and additions where necessary and send me any new names not listed. A new list will be prepared for the next newsletter.

☐

My name, address and telephone are correct
(if not, show change below)

☐

My interest in fire blight is correct
(if not, please indicate below)

☐

My name should be dropped from this list

☐

My/other name should be added to this list

NAME

ADDRESS

ZIP

TELEPHONE

Interest in fire blight research:

1 2 3 4

Interest in fire blight newsletter:

YES NO

I will serve as contact person
for newsletter questionnaire:

YES NO

} Please circle
one of each

Please return to your contact person or directly to:

T. van der Zwet
Appalachian Fruit Research Station
Route 2, Box 45
Kearneysville, West Virginia 25430

